



MultiMobile
Model MT5634ZLX/FE

**PC Card Modem with
Fast Ethernet Adapter**

User Guide

User Guide

88302901 Revision B

MultiMobile (Model MT5634ZLX/FE)

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Record of Revisions

Revision	Description
B (5/14/99)	Windows 95 driver software installation procedure updated. Other minor edits made.

Patents

This Product is covered by one or more of the following U.S. Patent Numbers: **5.301.274; 5.309.562; 5.355.365; 5.355.653; 5.452.289; 5.453.986** . Other Patents Pending.

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Notice

Though these modems are capable of 56K bps download performance, line impairments, public telephone infrastructure and other external technological factors currently prevent maximum 56 Kbps connections.

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Chapter 1 - Introduction and Description

Introduction

Welcome to the world of data communications. You have acquired one of the finest intelligent data and fax modems available today from one of America's oldest and most respected modem manufacturer: Multi-Tech Systems, Inc. This user's guide will help you install, configure, test and use your modem.

Product Description

The MT5634ZLX/FE is a multifunction communication device that lets you perform multiple communication tasks concurrently, using a single PCMCIA slot. The MT5634ZLX/FE:

- is V.90 and K56flex™ compatible for data transmission speeds up to 56 Kbps, while maintaining compatibility with lower-speed modems. The V.90 and K56flex standards asymmetrically transfer data--client downloads at speeds up to 56 Kbps, client uploads at speeds up to 33.6 Kbps;
- sends and receives faxes from computers or fax machines; and
- connects to an Ethernet 10BaseTX or 100BaseTX LAN.

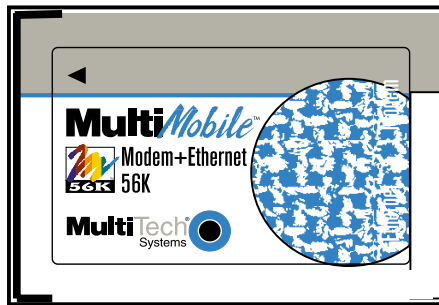


Figure 1-1. MT5634ZLX/FE PCMCIA Card

The MT5634ZLX/FE is a credit-card-size Type II PCMCIA card that complies with the PCMCIA 2.1 and JEIDA 4.1 standards and works with computers that incorporate a compatible interface. It is Bell, ITU-T and AT command compatible, allowing it to be used worldwide with today's popular communication software programs. You can send and receive faxes with any Group 3 fax machine. The broad Card and Socket Services (CSS) compatibility also makes for trouble-free Internet and Intranet connections. For those who prefer not to use CSSs, the MT5634ZLX/FE includes a point enabler for the multifunction card. Using standard phone lines and 10BaseTX Ethernet, the MT5634ZLX/FE lets you access servers on a LAN and connect to the Internet or on-line computer networks such as CompuServe and America Online, and permits you to transmit E-Mail, send and receive information, and communicate with other PCs.

Fast Ethernet

Fast Ethernet is a network technology specified by IEEE Standard 802.3u. It extends the traditional 10 Mbps Ethernet technology to achieve 100 Mbps transmission and reception, while retaining the same CSMA/CA Ethernet protocol. Thus while Fast Ethernet provides a tenfold increase in network capacity, it is wholly compatible with traditional 10 Mbps Ethernet network facilities. This compatibility is the key to easy and efficient upgrades to 100 Mbps in your network areas needing greater bandwidth. Upgrading selected areas to Fast Ethernet does not require hardware or software changes in network areas where traditional 10 Mbps Ethernet is providing good service. For upgrading existing Ethernet installations to 100 Mbps, and especially for selectively upgrading areas needing upgrade, Fast Ethernet is the clear choice in terms of cost-effectiveness, as well as convenience and smoothness in transition.

Fast Ethernet comprises two subtypes: 100Base-T4 and 100Base-TX. 100Base-T4 Fast Ethernet can utilize existing Category 3 or Category 4 UTP network cabling, but does not provide

for full duplex operation. 100Base-TX requires Category 5 cabling, but does provide full duplex operation. Full duplex 100Base-TX operation allows simultaneous transmission and reception, both at 100 Mbps, thus providing service potentially equal to 200 Mbps half-duplex service. The MT5634ZLX/FE does not support the 100Base-T4 subtype. To provide compatibility in traditional 10 Mbps Ethernet environments (where, for example, MT5634ZLX/FE cards are installed *anticipating* upgrade of supporting hub equipment to Fast Ethernet), the MT5634ZLX/FE also supports traditional 10 Mbps Ethernet operation, in full-duplex as well as half-duplex modes. Selection of the best operation mode in any given installation is automatically governed by auto-negotiation.

Auto-negotiation

You have probably had the experience of making a dialup connection through a modem, and have heard the gravelly-sounding exchanges between your modem and the modem at the other end of the telephone line (these exchanges are ordinarily played out through a speaker in your local modem). As irritating as those few seconds of noise may be, they do let you know that your modem and the remote modem are on the job, preparing for your intended communication with the remote computer. The preparatory work of the two modems during those few seconds before you see the “Connect” message is to *negotiate* the best data communication scheme which is supported by both modems, and which is suitable for the quality of the telephone line linkage between them. The parameters to be settled between the two modems include best baud rate, compression method, and error correction method. When the two modems have tested the phone line quality and settled on the combination of shared options and parameters which will provide the best data communication over the connecting phone line, then you are given the “Connect” message which signals the end of the intermodem negotiation and the beginning of your intended communication with the remote computer.

Auto-negotiation between devices within an Ethernet LAN is similar in concept, but much briefer. The two devices involved in the auto-negotiation will be the MT5634ZLX/FE card installed in your laptop PC, and the hub through which it is connected into the LAN. The options to be negotiated between the MT5634ZLX/FE and its supporting hub include Ethernet type (100BASE-TX Fast Ethernet or 10BASE-T Ethernet) and duplex mode (half-duplex, being one-way-at-a-time, or full duplex, being simultaneous transmit-and-receive). Startup communication between the two devices occurs when both devices are power-on, the cable connection between them is good, and the Network Operating System software is running. As soon as those conditions are satisfied, the preparatory process of auto-negotiation between the MT5634ZLX/FE and its supporting hub proceeds automatically. If the hub has auto-negotiation functionality, then it and the MT5634ZLX/FE exchange a series of messages in which each device signals its capabilities and listens for corresponding information about the other. The auto-negotiation process requires only a few milliseconds, and the two devices select the best communication parameters supported by both devices. If the hub does not have auto-negotiation functionality, then its monotone (single capability) message will be recognized by the MT5634ZLX/FE’s auto-negotiation facility, and the MT5634ZLX/FE will simply switch to the one of its own capabilities which matches that of the hub.

When the preparatory procedure of auto-negotiation is completed, the line is ready and will provide a data channel which is optimal for the two devices. The line will remain ready without further auto-negotiation action until the linkage is broken. Auto-negotiation then reoccurs at any time that the linkage is restored, again making the line ready for optimal data communications.

Category 3 and Category 5 Ethernet Cabling

The MT5634ZLX/FE supports Category 5 unshielded twisted-pair (UTP) cabling for Ethernet LAN operation. Cat. 5 UTP cable uses the same RJ-45 connector that is used with 10BASE-T. (Cat. 3 cable can be used if the 100 Mbps port is running at 10 Mbps.) For 10 Mbps operation, use 100m/Cat. 3/4/5 UTP/STP cable. For 100 Mbps operation, use 100m/Cat. 5 UTP/STP cabling.

Technical Specifications

PC Card Interface

PCMCIA Type II

Dimensions

3.37" X 2.128" X 0.197"
(85.6 mm X 54 mm X 5 mm)

Weight

2.1 oz. (60 g.)

Power Consumption

0.86 W (Concurrent mode)

Cables and Connectors

Two 15-pin detachable connectors to PC Card, one with an RJ-11 6-pin jack for 56K Fax/Modem and one with a RJ-45 8-pin jack for 10/100 Fast Ethernet LAN connections.

Network

IEEE 802.3 (10 Mbps 10BaseT)
IEEE 802.3u (100 Mbps 100BaseTX)

Interrupt & I/O Address Base Selection

IRQ: 3, 4, 5, 7, 9, 10, 11, 12, 15
I/O base for LAN: 220, 300, 320, 340
I/O base for fax/modem: COM 2, COM 3, COM 4

Modem Characteristics

Client-to-Server

Data Rates V.90 or K56flex speeds when accessing an ISP-type V.90 or K56flex server (actual speed depend on server capabilities and line conditions)

Client-to-Client

Data Rates 33,600, 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, 2400, 1200, 0-300 bps

V.42 bis & MNP 2-5 data compression & error correction, AT Command Set

Fax

Group 3, V.17 14400 bps and V.29 9600 bps
Fax Service Class 1 compliant

Modem Operating Protocol

V.90 or K56flex (down-stream up to 56,000 bps)
V.34bis (up to 33,600 bps)
V.34 (2,400 to 28,800 bps)
V.32bis, V.32, V.22bis, V.23, V.22/Bell 212A, V.21/Bell 103

Error Correction & Data Compression

V.42/V.42bis and MNP Class 2 to 5

Fax Compatibility

Group 3 send and receive
EIA Class 1 fax commands
V.17 (14.4 Kbps), V.29 (9.6 Kbps), V.27ter (4.8 Kbps), V.21 (300 bps)

Dialing Capability

DTMF tone and rotary pulse

Operating Modes

Asynchronous full duplex
Manual/Automatic answer

Receive Sensitivity

-40 dBn

Transmit Level

Permissive -12 (+/- 1) dBm

Telephone Line Interface

RJ-11, 2-wire dial-up

Note: Although V.90 and K56flex technologies are capable of downloads of up to 56 Kbps, FCC regulations currently restrict ISP modems to downloads of 53 Kbps.

Features

- Compatible with most notebook, laptop and portable computers
- Compatible with Card and Socket Services
- Easy to install and use
- Supports popular network OSs (e.g., Windows 98, Windows 95 (OSR2), Windows NT 4.x/3.x, Windows 3.x, DOS, Novell Netware Client, Personal Netware, Netware IPX/SPX, Microsoft LAN Manager, Artisoft LANtastic, IBM LAN Support, FTP TCP/IP, Banyan VINES, Packet Driver, and more)
- Supports popular Fax/Modem communication programs
- V.90/K56flex auto-sensing
- Compatible with both traditional PCMCIA slot and advanced 32-bit CardBus slot
- 10 or 100 Mbps Ethernet data rate auto-negotiation (10/100M auto-negotiation)
- V.90 or K56flex data mode (modem) auto-sensing
- Ethernet full-duplex mode that doubles the network connection speed
- Digital line protection to protect modem against connecting to high current digital PABX
- PCMCIA client enabler support
- Wide range of PCMCIA Card/Socket Services (CSS) support
- Concurrent use of Fast Ethernet LAN and fax/modem operation
- Menu-driven installation utility and LAN diagnostics program included
- PC card hot swap support
- Multifunction capability provides concurrent LAN and Modem operation
- Multifunction CIS
- NE2000 compatible

- Concurrent, Low Power, and Sleep modes
- Auto-Sync protocol support
- POST and Loopback Tests
- Pulse/Tone and Adaptive Dialing

System Requirements

- An IBM compatible PC or notebook computer with 386SX or faster processor
- At least one type II PCMCIA socket or 32-bit CardBus slot
- PCMCIA release 2.1 compliant Card Services and Socket Services
- Drivers and utilities (provided with this product) loaded on your PC
- an RJ11 jack for connecting to a phone plug
- an RJ-45 jack for 100BaseTX connection to your Ethernet LAN

Ship Kit Contents

Your MT5634ZLX/FE is shipped from the factory with the following:

- an **MT5634ZLX/FE** PCMCIA LAN/Fax/Modem Card
- a phone cord with RJ-11 plug
- one 3-1/2" Software Drivers diskette
- a printed Quick Start Guide manual
- a User Guide manual on diskette
- Fax/Modem communications software
- one Ethernet LAM, with an RJ-45 connector and 3 LEDs (LINK, ACT, and 10/100)
- one Modem LAM, with an RJ-11 connector and 4 LEDs (OH, CD, RD and TD)



Chapter 2 - Quick Start

Unpacking

The shipping box contains the MT5634ZLX/FE, PCMCIA LAN/Fax/Modem Card, one RJ-11 cable, your Quick Start Guide, two disks (i.e., the MT5634ZLX/FE driver and fax/modem communications software on one disk and the MT5634ZLX/FE User Guide on the other disk), one Ethernet LAM with an RJ-45 connector and three LEDs (LINK, ACT, and 10/100), and one Modem LAM with an RJ-11 connector and four LEDs (OH, CD, RD, and TD). Inspect the contents for signs of any shipping damage. If damage is observed, do not power up the unit; contact Multi-Tech's Technical Support for advice (refer to Appendix D). If no damage is observed, perform the cabling procedure.

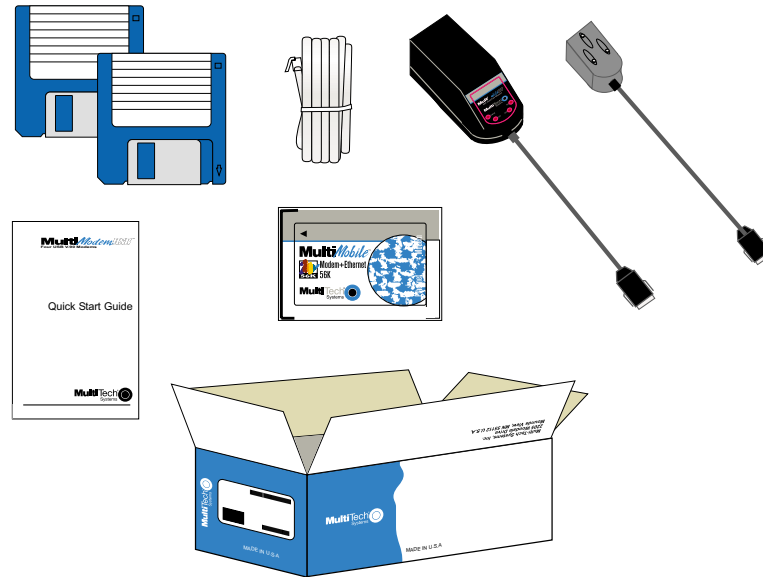


Figure 2-1: Unpacking

Safety Warning Telecom

1. Never install telephone wiring during a lightning storm.
2. Never install a telephone jack in wet locations unless the jack is specifically designed for wet locations.
3. This product is to be used with UL and cUL listed computers.
4. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
5. Use caution when installing or modifying telephone lines.
6. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.
7. Do not use a telephone in the vicinity of a gas leak.
8. To reduce the risk of fire, use only 26 AWG or larger telecommunication line cord.

MT5634ZLX/FE LAM Information

The MT5634ZLX/FE is shipped with two LAMs (Line Access Modules) that are required for connecting the modem to the Public Switched Telephone Network and to the Ethernet LAN.

The Ethernet LAM (Figure 2-2) connects the MT5634ZLX/FE to the Ethernet LAN. It has a keyed connector (labeled “*Press Down to Release*”) at the PC Card side, and an RJ-45 connector at the Ethernet LAN side. The Ethernet LAM has 3 LEDs, labeled Act, 10/100, and Link.

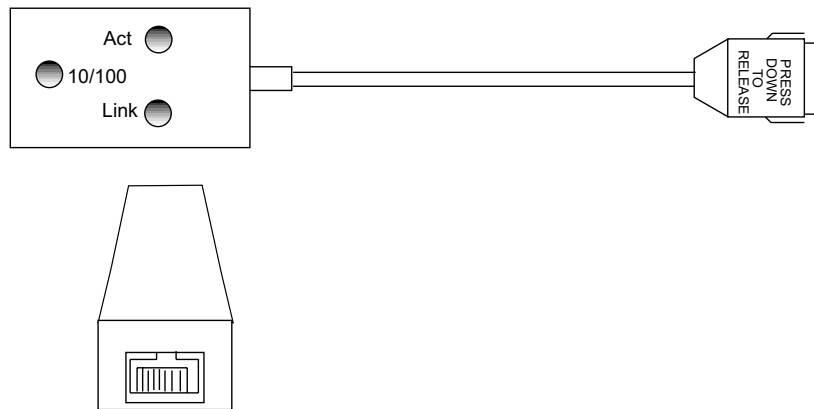


Figure 2-2. The MT5634ZLX/FE Ethernet LAM

The MODEM-LAM (Figure 2-3) is slightly longer than the Ethernet LAM. The MODEM-LAM has a keyed connector at the PC Card side, and an RJ-11 connector at the PSTN side. The MODEM-LAM has 4 LEDs, labeled TD, RD, CD, and OH.



Figure 2-3. The MT5634ZLX/FE MODEM-LAM

Installing the MT5634ZLX/FE Card

To install your MT5634ZLX/FE (refer to Figure 2-4), perform the following steps:

1. Verify that your PC meets the system requirements in Chapter 1.
2. Insert the MT5634ZLX/FE card into the computer's PCMCIA slot with the 68-pin connector facing the PCMCIA slot and the label facing up.
3. For DOS or NetWare client environments, run the menu-driven Install Utility; in other client environments, go to step 4.
4. Plug the 15-pin MODEM-LAM into the 15-pin Modem socket of the PC card; connect the other end of the MODEM-LAM to the telephone system (PSTN) by plugging an RJ-11 cable plug into the MODEM-LAM's 6-pin RJ11 receptacle and plug the other end of the RJ11 cable into an available PSTN receptacle.
5. Plug the 15-pin Ethernet-LAM into the 15-pin Ethernet socket of the PC card; connect the other end (8-pin RJ-45) of the Ethernet-LAM to the Ethernet LAN using a UTP or STP cable.
6. With the PC powered on, verify MT5634ZLX/FE LED operation. Proceed to the Installing Driver and Modem Software section.

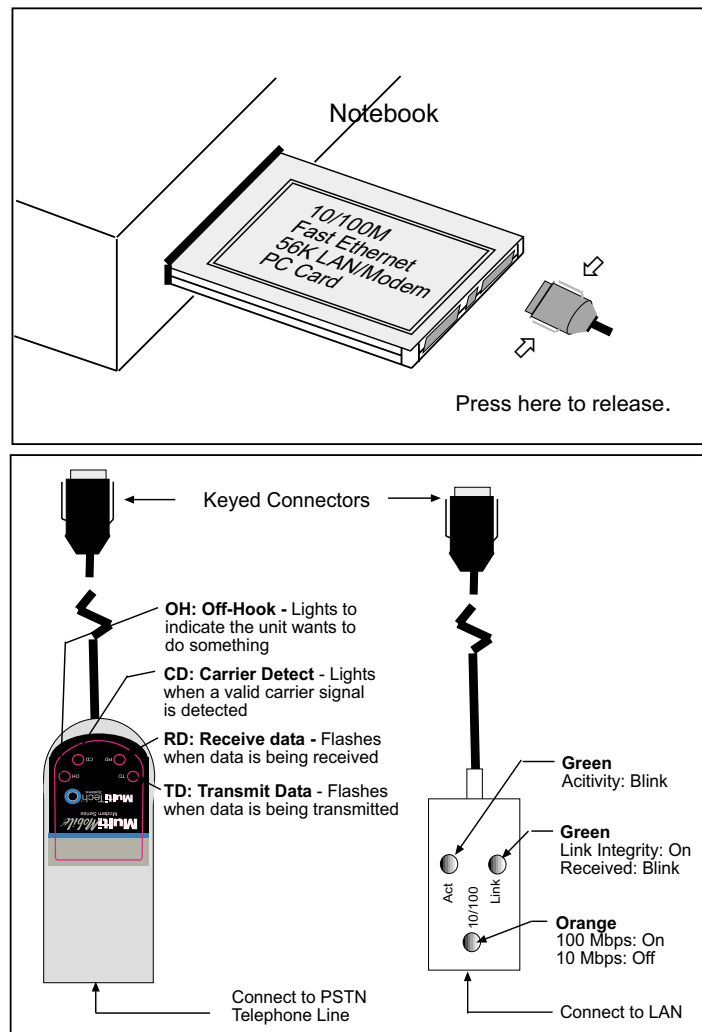


Figure 2-4. MT5634ZLX/FE Installation

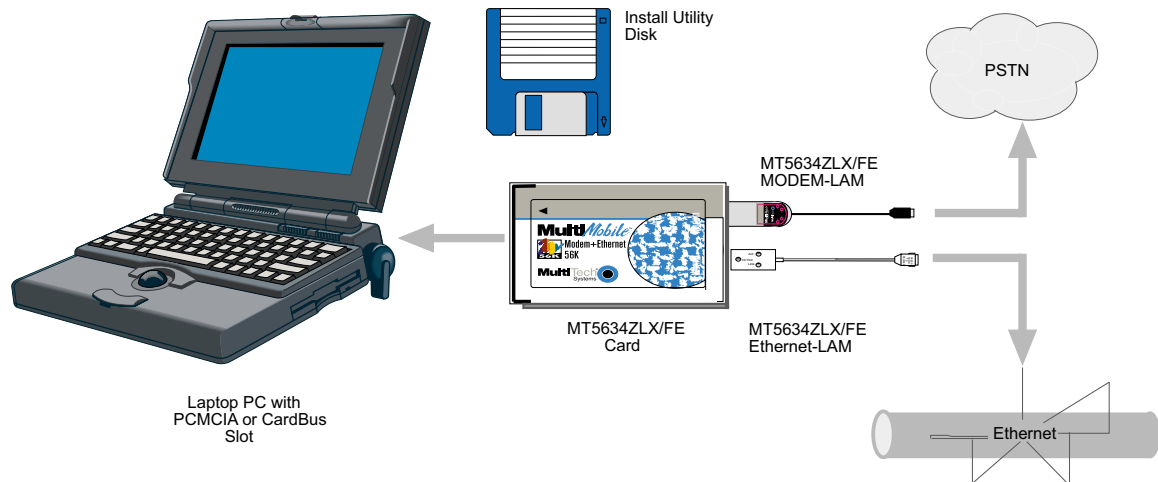


Figure 2-5. Typical MT5634ZLX/FE Installation

LED Indicators

Modem-LAM

The Modem-LAM has four LED indicators for status monitoring and troubleshooting:

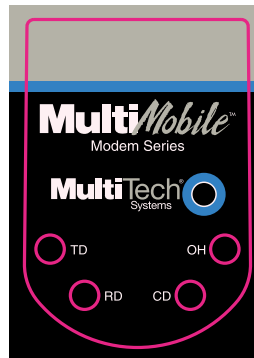


Figure 2-6. MODEM-LAM LEDs

LED: TD

Meaning: The TD (Transmit Data) LED flashes when data is being transmitted.

LED: RD

Meaning: The RD (Receive Data) LED flashes when data is being received.

LED: CD

Meaning: The CD (Carrier Detect) LED lights when a valid carrier signal from another modem is detected.

LED: OH

Meaning: The OH (Off Hook) LED lights to indicate to the central office that the MT5634ZLX/FE wants the phone line to do something (i.e., dial or answer a call). This LED is also lit when the MT5634ZLX/FE has achieved on-line status.

Ethernet LAM

The Ethernet-LAM has three LED indicators for status monitoring and troubleshooting.

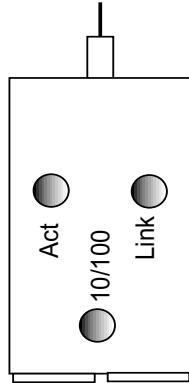


Figure 2-7. Ethernet-LAM LEDs

LED: Act

Meaning: The Act (Activity) LED lights when the RJ45 link is active. The Act LED blinks when there is an Ethernet Link failure.

LED: 10/100

Meaning: The 10/100 LED lights when a 100Mb Ethernet (100BASE-TX) link is active. When a 10 Mb Ethernet (10BASE-T) link is active, this LED is not lit. The 10/100 LED blinks when there is an Ethernet Link failure.

LED: Link

Meaning: The Link LED lights when the Ethernet network is active. The Link LED is off when the Ethernet network is idle.

Installing Driver and Modem Software

Installation is in two parts; loading the driver software and then loading the modem software.

Windows 98 Installation

1. Turn on your computer.
2. Ensure that the Ethernet LAM connector is connected to the LAN port on the PCMCIA card (slot on the left) and that the RJ-45 connector is plugged into the hub.
3. Insert the MT5634ZLX/FE card into an open PCMCIA slot and make sure it is firmly seated.
4. Windows 98 displays the **New Hardware Found** screen followed by the **Add New Hardware Wizard** dialog box.



Click **Next >**.

5. The **Add New Hardware Wizard** is displayed asking “What do you want to do?”.



Ensure that the “Search for the best driver for your device (Recommended)” option is enabled and then click **Next >**.

6. The **Add New Hardware Wizard** dialog box is displayed.



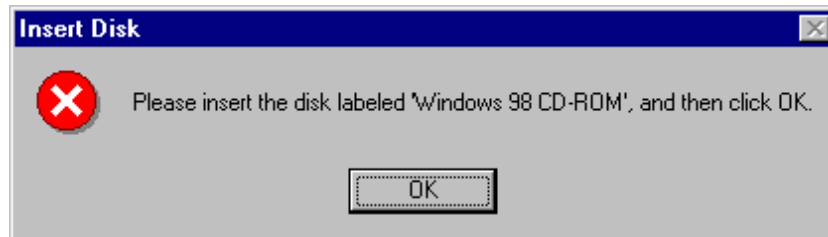
Insert the MT5634ZLX/FE Driver disk, ensure that the “Floppy Disk Drives” option is enabled, and then click **Next >**.

7. The **Add New hardware Wizard** is displayed indicating that it is ready to install the best driver for the device.



Click **Next >** to copy driver files to the system.

- Once the files have been copied to the system, Windows detects new hardware and displays the **New Hardware Found** screen (indicating that it has found the new modem card), and then displays the **Copying Files** screen. Once completed, the **Insert Disk** screen is displayed.



Insert the Windows 98 CD and click **OK**.

- The **Add New Hardware Wizard** dialog box is displayed.



Click **Finish** to complete the installation of the network interface card.

- The **Copying Files** screen displays indicating that the files are being copied to the system. When completed, the screen disappears.
- Remove the Windows 98 CD and the driver disk from the floppy drive.
At this point, the Link Light and the Activity light on the Ethernet LAM should be steady green.
- To complete the installation, reboot the computer.

NOTE: Before rebooting, you need to ensure that the appropriate networking clients, protocols, and/or services are present. Go to **Control Panel | Network** and then to the **Configuration** tab to make the appropriate selections.

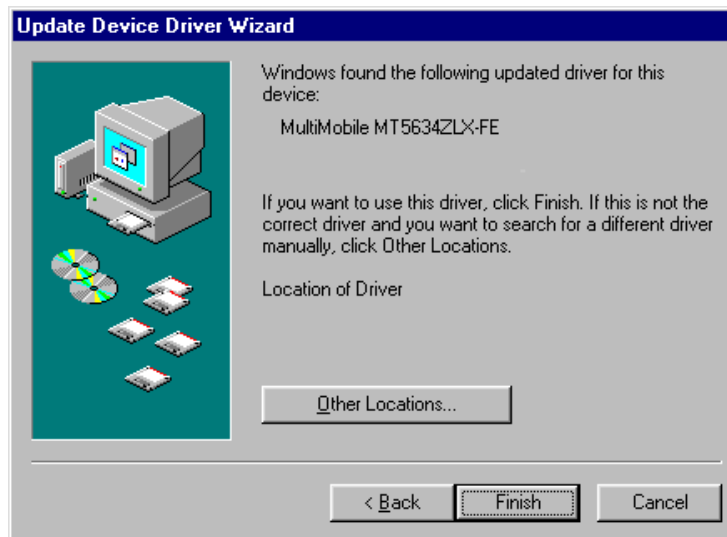
Windows 95 Installation

1. Turn on your computer.
2. Ensure that the Ethernet LAM connector is connected to the LAN port on the PCMCIA card (slot on the left) and that the RJ-45 connector is plugged into the hub.
3. Insert the MT5634ZLX/FE card into an open PCMCIA slot and make sure it is firmly seated.
4. Windows briefly displays the **New Hardware Found** dialog box and then the **Update Device Driver Wizard** is displayed.



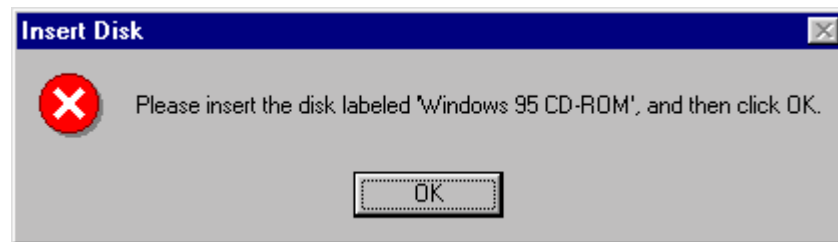
Click **Next >**.

5. The **Update Device Driver Wizard** is displayed indicating it has located the driver.



Click **Finish**.

6. A series of screens are displayed including Building Driver information data base". Once finished, the **Insert Disk** screen is displayed.



Insert the Windows 95 CD and click **OK**.

7. The **Copying Files** screen is displayed. Once the files have been copied to the system, the screen disappears.
8. Remove the Windows 95 CD and the driver disk from the floppy drive.
At this point, the Link Light and the Activity light on the Ethernet LAM should be steady green.
9. To complete the installation, reboot the computer.

NOTE: Before rebooting, you need to ensure that the appropriate networking clients, protocols, and/or services are present. Go to **Control Panel | Network** and then to the **Configuration** tab to make the appropriate selections.

Windows NT 4.0 Installation

Getting Started with Windows NT 4.0

1. Remove all existing PC Cards from the system.
2. Run Windows NT 4.0.
3. Login with full access (i.e., ADMINISTRATOR).
4. Remove all network support from **My Computer | Control Panel | Network | Adapters**.
5. Click **Close** after all network components are removed.
6. Remove all serial port devices in **My Computer | Control Panel | Ports**.
7. Click **Close** after all serial port devices are removed.
8. Restart Windows NT.

MT5634ZLX/FE Installation in NT 4.0

1. Insert the MT5634ZLX/FE into an open PCMCIA slot.
2. Login with full access (i.e., ADMINISTRATOR).
3. Open **My Computer | Control Panel | Network**.

If **Network** has not been installed, do steps a - j first and then proceed to step 4; otherwise, if **Network** has already been installed, go directly to step 4.

- a. Select **Yes** to start Network installation.
- b. Click **Next >** and press **SELECT FROM LIST** button, then press **Have Disk**.
- c. Insert the MT5634ZLX/FE Driver disk into the floppy disk drive, then enter the correct path.
- d. Make a single selection for the MT5634ZLX/FE, then press **OK** and **Next >**.
- e. Windows NT 4.0 will grant configurations for:
 - TCP/IP
 - NWLink IPX/SPX
 - NetBEUI ...

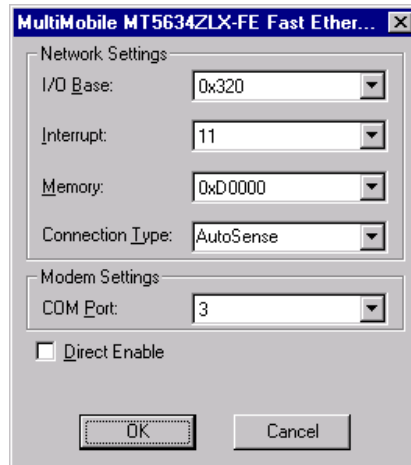
These configurations are unique for each network. To change them, ask your network administrator for help.

- f. Click **Next >** twice to use default NETWORK SERVICES settings.
- g. Enter the correct path for NT 4.0 system source files.
- h. A dialog box is displayed. Provide appropriate system resources to the unit; the settings must be unique for this device. Refer to "Resources Recommendation" for NT 3.51 details.
- i. Click **Next >** twice. Enter **Computer Name** then press **Next >**.
- j. Click **Finish**.

Once **Network** has been installed, continue with the following:

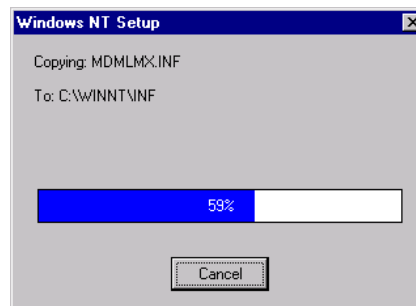
4. Select **Adapters**.
5. Click **Add** to add network adapters.
6. Insert the MT5634ZLX/FE Driver disk into floppy disk drive and click the **Have Disk** button.
7. Enter the correct path (A:) for Windows NT 4.0 drivers then press **OK**.
8. The **Select OEM Option** dialog box is displayed. Click **OK**.

9. The **MultiMobile MT5634ZLX/FE Fast Ethernet** dialog box is displayed.

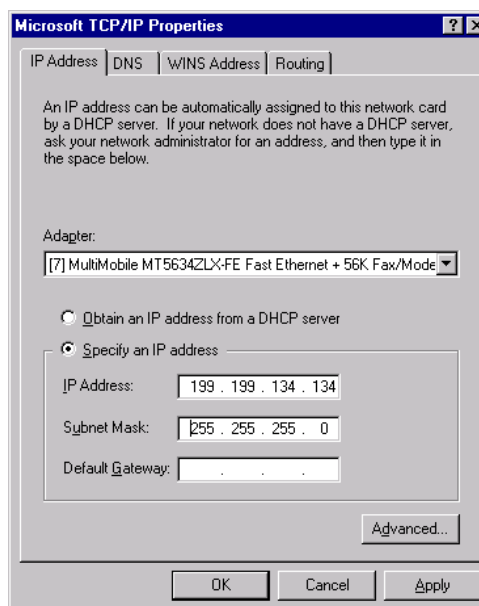


Accept the defaults and click **OK**.

10. The **Copy Files** screen is displayed.



11. Once all files have been copied, the **Network** Dialog box is displayed. Click **Close**.
12. Once the files have been copied to the system, the **Microsoft TCP/IP Properties** dialog box is displayed.



CAUTION: The IP Address, Subnet Mask, (See examples in dialog box above) and Default Gateway address must be entered by the network administrator.

Once the information has been entered, click **Apply** and then **OK**.

13. The **Network Settings Change** dialog box is displayed.



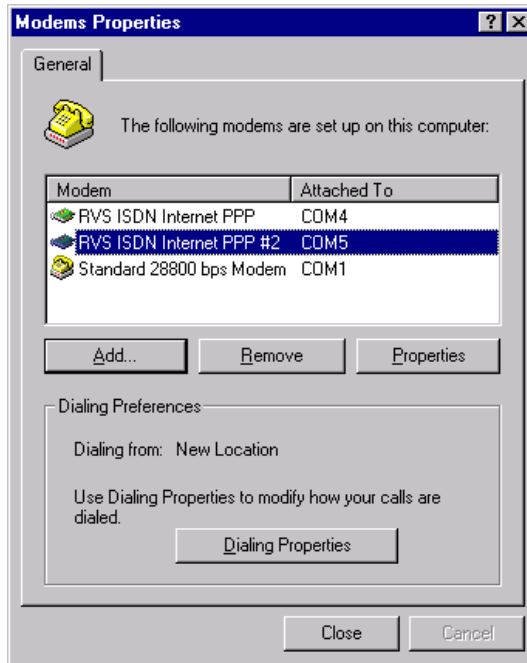
Remove the driver disk and then click **Yes** to save the settings to the system and reboot Windows NT.

Modem configuration for NT 4.0

1. Open **My Computer | Control Panel** and double-click the **Modems** icon.

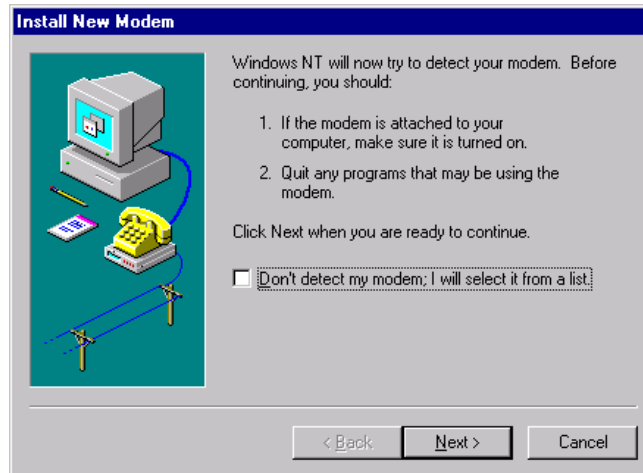
Note: If modems have already been installed, the **Modems Properties** dialog box is displayed (See step 2). If no modems have previously been installed, the **Install New Modem** dialog box is displayed (See step 3).

2. The **Modem Properties** dialog box is displayed.



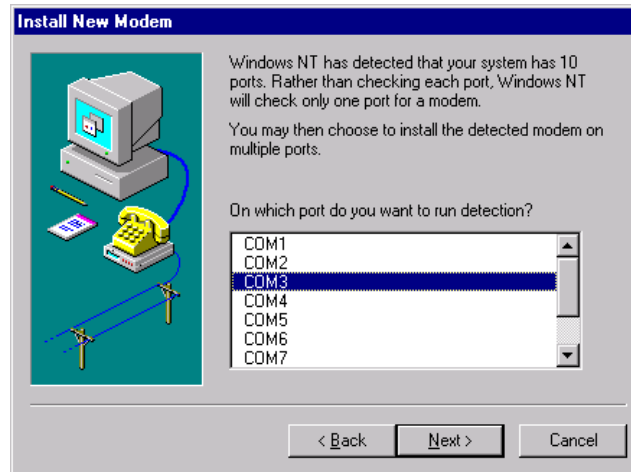
Click **Add**.

3. The **Install New Modem** dialog box is displayed.



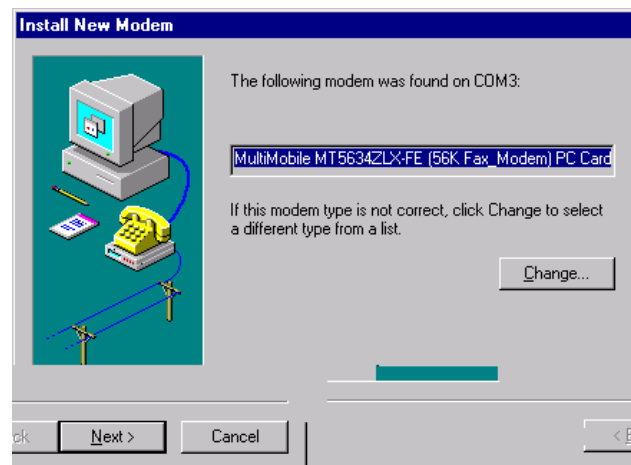
Click **Next >**.

4. The **Install New Modem** dialog box is displayed indicating the COM port where you can find the modem.



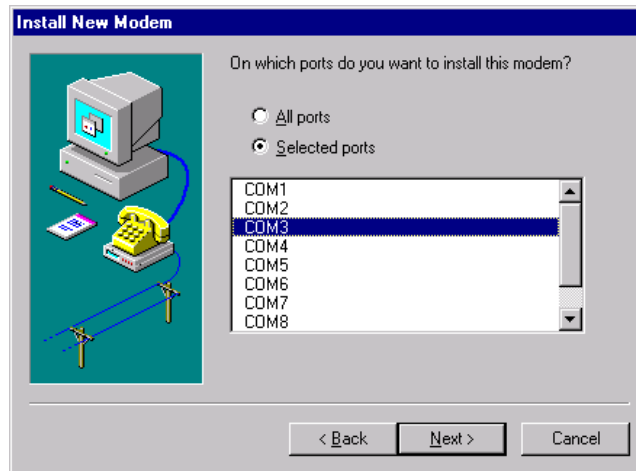
Highlight the appropriate COM port and click **Next>**.

5. Windows looks for the appropriate COM port and displays the **Install New Modem** dialog box identifying the correct COM port with the modem card.



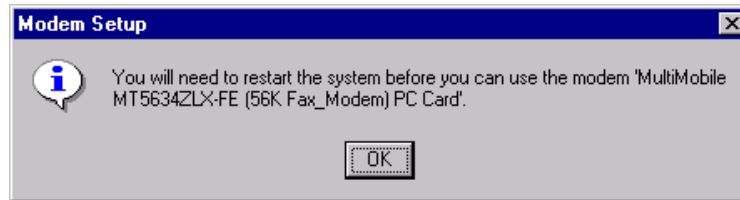
Click **Next >**.

6. The **Install New Modem** is displayed asking for the COM port where you want to install the modem.



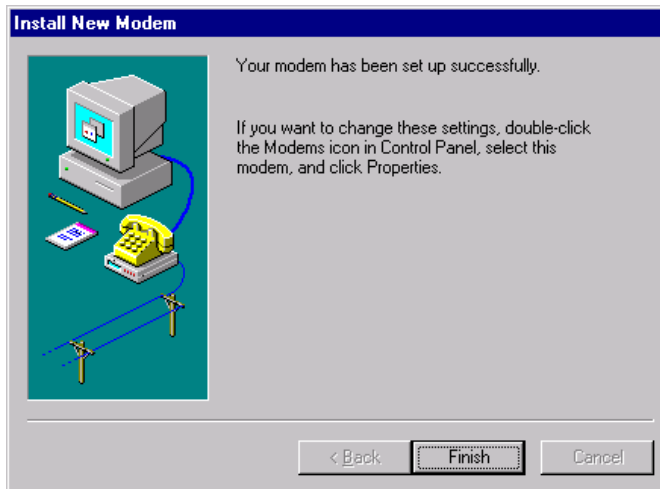
Click **Next >**.

7. Windows installs the modem and then the **Modem Setup** dialog box is displayed indicating that you need to restart your PC.



Click **OK**.

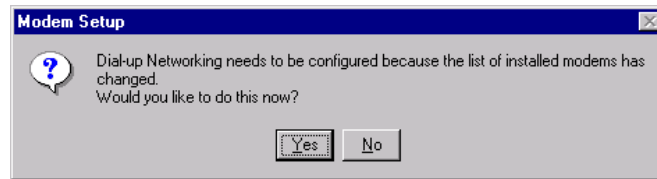
8. The **Install New Modem** dialog box is displayed indicating that the modem has been set up successfully.



Click **Finish**.

9. The **Modem Properties** dialog box is displayed. Click **Close** to complete the modem setting.

10. The **Modem Setup** dialog box is displayed asking if Dial-up Networking needs to be configured.



Click **No**.

11. Reboot the system.
12. The installations for both LAN and Modem are completed.

Windows NT 3.51 Installation

Getting Started with Windows NT3.51

1. Run Windows NT 3.51.
2. Login with a full access level (i.e., ADMINISTRATOR).
3. Remove all existing network support
 - a. open **Program Manager | Main group | Control Panel | Network**
 - b. remove all existing network components

Note: Remove all adapters first, then servers, then workstations, etc.

Add PCMCIA to Your Laptop

1. Open **Program Manager | Main group | Control Panel | Devices**.
2. Select **PCMCIA**.
3. Click **Startup**.
4. Select **Boot**, then click **OK**.
5. When all PCMCIA adapters are added, click **Close** and restart Windows NT.

Check **Event Viewer** after your system reboots. Ask your laptop dealer for help if any problems occur.

MT5634ZLX/FE Installation in NT 3.51

1. Insert the MT5634ZLX/FE card into an open PCMCIA slot.
2. Run Windows NT.
3. Login with full access (i.e., ADMINISTRATOR).
4. Open **Program Manager | Main group | Control Panel | Network**.
5. Click **Yes** to install network components.
6. Enter the correct path for NT installation media (CD-ROM). For example, **D:\i386**.
7. Click **“Do not detect for the network adapter”**.
8. Open the **Network Adapter Card** selection box.
9. Select **<OTHER> REQUIRES DISK FROM MANUFACTURER**.
10. Click **Continue**.
11. Insert the driver disk into floppy disk drive, then enter the correct path (A:\).
12. Select the MT5634ZLX/FE, then click **OK**.
13. A dialog box is displayed for the driver settings change.
14. Give appropriate system resources to the MT5634ZLX/FE (the settings must be unique for this device). Recommended resources:
 - I/O Base Address: 300. Possible alternative: 220, 320, 340
 - Interrupt (IRQ): IRQ 5. If your laptop has multimedia devices, a higher interrupt (e.g., IRQ:11) may be needed.
 - Base Memory: D000. Possible alternative: D800
 - COM Port: COM2 to COM4. Select one of the COM ports that is not in use by other communication devices.
15. When all settings are completed, click **OK**. Windows NT will load network and grant configurations for:
 - NWLink
 - TCP/IP
 - NetbeuiTypically the configurations are unique for each network. If you want to change them, ask your network administrator for help.
16. Once all network softwares are loaded, click **OK**. The configuration and bindings for the MT5634ZLX/FE are confirmed. Answer the questions accordingly.
17. Connect to your network using the provided Ethernet LAM RJ-45 jack.
18. Reboot the system.

Artisoft Lantastic 6.0 Installation

1. Install LANTASTIC 6.0.
2. Run INSTALL.EXE from the MT5634ZLX/FE driver disk root directory.
3. Select **LANTASTIC 6.0** in Network Operating System screen, then **Driver Install** screen.
4. If current settings are correct, select **Start Installation** and go to step 6. Otherwise, select **Modify Parameters** to make changes.
5. Move the cursor to each field you want to modify, make modifications, click **Enter** to set the correct value, then click **OK**.
6. The Installation program starts copying drivers and modifying CONFIG.SYS, PROTOCOL.INI, and STARTNET.BAT.
7. Reboot the computer.

For Non-Windows 95/98/NT Systems

Insert the driver diskette into the floppy drive and set the current drive to the floppy drive (A:\). Then run **INSTALL** to install the driver.

Novell NetWare Installation

Follow the steps below to complete the Novell Netware installations.

1. Run the installation program **INSTALL.EXE** from the Driver disk (for example, A:\INSTALL).
2. Select **Netware 3.x and 4.x Workstation** in the installation program dialog box.
3. Check the card settings. If current settings are correct, select **Start Installation** and go to step 5. Otherwise, select **Modify Parameters** to change settings.
4. Select the appropriate values then click **Enter**. When you are finished, click **OK** to exit.
5. The installation program starts installing drivers and modifying **AUTOEXEC.BAT** and **NET.CFG**.

Select **Yes** then click **Enter** to modify the files. The installation is now complete.

6. Restart your computer to make NetWare connections.

To install the ODI driver manually, follow the instructions below:

1. Copy the file **NETWARE\LMODI.COM** \NETWARE\NET.CFG and the file **ENABLER\LMVXD.386** from the driver disk to your local hard disk.
2. Use a text editor to edit the NET.CFG for setting the frame type. The frame type default is set to 802.3 for Netware 3.11 server and 802.2 for Netware 3.12 and 4.x servers. The frame type set in NET.CFG must match that set in Netware servers.
3. Use following format to create a startup batch file:

```
LSL           ;Link Support Layer Module
              ;provided by Novell

LMODI        ;Hardware Specific Module

IPXODI       ;IPX Protocol Stack Module
              ;provided by Novell

NETx         ;Shell Support Module provided by
              ;Novell
```

LOGIN

MS LAN Manager Installation

1. Check the README.TXT in the **INDIS2** directory on the MT5634ZLX/FE driver disk. Before installing the drivers, ensure that the Microsoft LAN Manager has been installed in the target path. The installation program will check and modify the PROTOCOL.INI file for LAN Manager.
2. Run **INSTALL.EXE** in the root of driver diskette (A:\INSTALL).
3. Select **Microsoft LAN Manager** from the menu screen.
4. Check the card settings. If current settings are correct, select **Start Installation** and go to step 5. Otherwise, select **Modify Parameters** to change settings.
5. Select the appropriate values then click **Enter**. When you are finished, click **OK** to exit.
6. The installation program starts installing drivers and modifying **CONFIG.SYS** and **PROTOCOL.INI**.
Select **Yes** then click **Enter** to modify the files.
7. The installation is now complete.
8. Reboot the computer to load drivers and start LAN Manager.

Example of PROTOCOL.INI:

[PROTMAN]

```
DRIVERNAME = PROTMAN$  
DYNAMIC = YES  
PRIORITY = NETBEUI
```

[NETBEUI_XIF]

```
Drivername = netbeui$  
SESSIONS = 6  
NCBS = 12  
BINDINGS = "LMNDIS_NIF"  
LANABASE = 0
```

[LMNDIS_NIF]

; protocol.ini session for multifunction
LAN/MODEM driver.

```
IOADDRESS = 0x320  
INTERRUPT = 11  
DRIVERNAME = LMNDIS$
```

Packet Driver Installation

1. Run the **INSTALL.EXE** file in the driver diskette (A:\INSTALL).
2. Select **Packet Driver** from the menu screen.
3. Check the card settings. If current settings are correct, select **Start Installation** and go to step 5. Otherwise, select **Modify Parameters** to change settings.
4. Select the appropriate values then click **Enter**. When you are finished, click **OK** to exit.
5. The installation program starts installing drivers and modifying **AUTOEXEC.BAT**. Select **Yes** then click **Enter** to modify the files.
6. Reboot the computer to load the driver.

Windows for Workgroups 3.11 Installation

1. Run **INSTALL.EXE** from the root directory of MT5634ZLX/FE Driver disk.
2. Select **Windows for Workgroup** in the Network Operating System screen.
3. If current settings are accepted, select **Start Installation** and go to step 13. Otherwise, select **Modify Parameters** to make modifications.
4. Move the cursor to the setting you want to make a change for then click **Enter** to select a fit value. When the configuration is accepted, click **Enter** on the **OK** field to exit the screen and go back to step 3.
5. Select **NDIS Server (LAN Manager,...)** as the network server that you will attach to, then click **Enter**.
6. The installation program starts installing drivers and modifying **AUTOEXEC.BAT**. Select **Yes** then click **Enter** to modify the files.
7. Run Windows for Workgroups and click the **Network Setup** icon in the **Network** group.
8. In the **Network Settings** dialog box, click the **Networks...** button to select the network operating system.
9. In the **Networks** dialog box, check the **Install Microsoft Windows Network** option and the **No Additional Network** option. Click **OK** to return to the **Network Settings** screen.
10. Click the **Drivers...** button to select network driver.
11. From the **Network Drivers** dialog box, click the **Add Adapter...** button to enter the **Add Network Adapter** dialog box. Select **Unlisted or Updated Network Adapter** and click **OK**.
12. Windows will display the **Install Driver** dialog box. Insert the driver diskette into the floppy drive and click **OK**.
13. Select **Enhanced mode NDIS3 for....** then click **OK**.
14. Follow Windows instructions to complete the installation and exit Windows.
15. Reboot the computer to run with WFW 3.11.

Basic Modem Operation

This section covers the basic commands and techniques involved in modem operation. In many cases, this is the only information you will need to get your MT5634ZLX/FE up and running with communication software, and to start making connections with your MT5634ZLX/FE card.

Understanding AT Commands

The MT5634ZLX/FE communicates asynchronously with computers using AT commands. AT commands are used to configure and control the MT5634ZLX/FE. Commands are usually sent to the modem by way of communication software, but can also be entered manually with the computer keyboard.

Command statements must always begin with the letters **AT** or **at**, followed by one or more commands and the <Enter> key.

AT commands can only be issued when the MT5634ZLX/FE is in “Command mode” or “Off-line”. Once the MT5634ZLX/FE has established a connection with another modem, it is said to be “On-line” or in “Data mode.” In this mode, the characters sent to the MT5634ZLX/FE by your computer are transmitted to the remote modem rather than being interpreted by the MT5634ZLX/FE as commands.

Using the Windows 95/98/NT HyperTerminal Program

To issue an AT command statement, you first need to run a communication program such as the Microsoft Windows “HyperTerminal” program. This program provides a simple method to manually enter AT commands so you can do such things as “Customize” the settings of your MT5634ZLX/FE, or store commonly-dialed phone numbers.

Once the MT5634ZLX/FE is connected to your computer’s serial port and telephone line, open the Windows 95/98/NT “**Accessories**” program group, and open the HyperTerminal Program. The program will prompt you for a name and icon to use for your new connection. Type the name **Test Connection** then click <Enter>.

You are then prompted for country information, area code, phone number, and the device used to make the connection. For this test purpose, do not enter a phone number; simply choose the COM port your MT5634ZLX/FE is connected to from the “**Connect Using**” list. Click “**OK**” when finished.

The next window sets the COM port settings. Use the following MT5634ZLX/FE settings:-

- Bits per second: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow Control: Hardware

Click “**OK**” when finished. Then save your new connection by selecting “**Save**” from the “**File**” menu and click “**OK**.”

A new connection icon is added to your HyperTerminal folder. You can now start entering AT commands.

In the terminal window, type:

AT<Enter>

The MT5634ZLX/FE responds with:

OK

This confirms that the MT5634ZLX/FE and your computer are communicating correctly.

To test the telephone line connection, issue the manual answer command **ATA<Enter>**. The MT5634ZLX/FE will pick up the phone line and try to communicate. Normally, this command is only used to answer an incoming call made from another modem. Thus the high-pitched noise you will hear from the speaker. To abort the operation, click any key, or select “**Disconnect**” from the “**Call**” menu.

Dialing and Answering Techniques

Depending on what communications software you use to make modem connections, you may not have much control of how the modem dials the telephone number. This section shows some useful examples of the AT commands used for dialing and answering operations. The command characters specific to each function are shown in bold type.

Dialing using the ATD Command

Touch Tone Dialing: **ATDT** 555 1212
Pulse Dialing: **ATDP** 555 1212
Tone and Pulse Dialing: **ATDP** 555 1212 **WT** 24
Pausing During Dialing: **ATDT** 9,,555 1212

Auto-Answer and Hook Controls

Enabling Auto-Answer: **ATS0=n**

Note: In this example, n is a number from 1 to 255 that corresponds to the number of rings after which your modem answers an incoming call.

Disabling Auto-Answer: **ATS0=0**
Manually Answering a Call: **ATA**
Take modem off-hook: **ATH1**
Hang up modem (on-hook): **ATH0**
Manually Disconnecting a Call: **+++ATH**



Chapter 3 - AT Commands, S-Registers and Result Codes

Introduction

This chapter describes how to use AT commands, S-Registers and Result Codes.

How To Use AT Commands

Usually, your fax and data comm software controls the modem for you. However, you may also want to use the AT commands. These commands give you complete control over your modem. You need to be careful when using these commands, because they can cause your software to lose its ability to control the modem. If you do find that an AT command has caused a problem, then turn the computer off and then back on. That will reset most AT commands to the factory default settings. You can also type **AT&F&WZ** to go back to the factory default setting.

To use an AT command, you must first:

1. Run your communication software.
2. Configure the software for the appropriate COM port and IRQ settings, if necessary.
3. Enter Terminal mode (also "Command mode", "Local mode", or "Direct mode"). This is the mode in which most data comm software packages start up. You can then type the desired AT command, then click the **Enter** key.

For example, type:

ATH0<Enter> to hang up the modem connection, or

AT&K3<Enter> to enable bi-directional CTS/RTS hardware flow control.

Most of the AT commands can be entered in "strings" (i.e., on the same command line) without spaces between the individual commands. For example:

AT&K3H0<Enter>

As shown above, it is not necessary to put spaces between the commands. So, there are no spaces between **AT**, **&K3**, and **H0**.

The modem usually returns a response (or "Result Code") at the next line if it understands the command. The response is usually *OK* or *ERROR* unless the AT command provides other (extended) messages. The table below explains the AT commands in each of five categories (Basic, Ampersand, Per Cent, Back Slash, and Dash commands). An asterisk (*) indicates the factory default setting.

Basic AT Commands**Command Function** (* indicates factory default setting)

A/ Re-execute the last command string.
<any key> Terminate the current connection attempt when entered in handshaking state.

The following commands require an "AT" prefix.

A	Go off-hook and attempt to establish a connection without waiting for a ring
Bn	Line modulation options
B0	Select V.22 mode for 1200 bps connection
B1 *	Select Bell 212A for 1200 bps connection
B2	Select V.23 1200 bps for receiving, 75 bps for transmitting in originate mode; 75 bps for receiving and 1200 bps for transmitting in answer mode
B3	Select V.23 75 bps for receiving, 1200 bps for transmitting in originate mode; 1200 bps for receiving and 75 bps for transmitting in answer mode
B15	Select V.21 for 300 bps connection
B16	Select Bell 103 for 300 bps connection
Dn	Dial command, beginning the dialing sequence. The string "n" (telephone number and modifiers) listed as follows is entered after the "D" command
L	Re-dial last number. Should be the first character following ATD, ignored otherwise
P	Pulse dial
R	Reverse dial. Originate call in answer mode (go on-line in answer mode)
S=n	Dial the phone number stored in NVRAM at location "n" (n=0, 1, 2, 3)
T	DTMF tone dial
W	Wait for second dial tone. The modem waits for the second dial tone before processing the dial string Pause. Cause the modem to pause for a time before processing the next character in the dial string (specified by S8 register)
!	Hook Flash (for call transfer). Cause the modem to go on-hook for 0.5 second then return to off-hook
@	Wait for 5 seconds of silence after dialing number
;	Return to command state after dialing a number without disconnecting the call
En	AT command echo options
E0	Echo disabled
E1 *	Echo enabled
Hn	Switch-hook control
H0 *	Modem goes on-hook
H1	Modem goes off-hook
Mn	Speaker control
M0	Speaker always off
M1 *	Speaker on until carrier present

M2	Speaker always on
M3	Speaker off during dialing and on until carrier present
Nn	Select negotiate handshake
N0	When originating or answering, handshake only at the communication rate specified by S37 register and "ATBn" and no fallback
N1 *	When originating or answering, start handshaking only at the communication standard specified by S37 register and "ATBn". During handshake, fallback to a lower speed may occur.
On	Go on-line
O0	Return modem to a previously established state (return to data mode).
O1	Begin a retrain sequence, then return to on-line state.
O3	Issue a rate re-negotiation, then return to on-line state.
P	Enable pulse dialing (Disabled in CTR 21 approved models)
Qn	Result code display options
Q0 *	Result code enabled
Q1	Result code disabled
T	Enable tone dialing
Vn	Result code form
V0	Display result code in numeric form (see also the result code options table)
V1 *	Display result code in verbose (text) form
Wn	Select extended result code options
W0	CONNECT result code reports DTE speed. Disable protocol result codes. (See also the "Result Code Options Table")
W1	CONNECT result code reports DTE speed. Enable protocol result codes.
W2 *	CONNECT result code reports DCE speed. Enable protocol result codes.
Xn	Select result codes/call progress options.
X0	Display CONNECT or "1" for all speeds. Ignore dial tone and busy tone detection.
X1	Display connect message and the modem's data rate, and an indication of the modem's error correction and data compression. Ignore dial tone and busy tone detection.
X2	Display connect message and the modem's data rate, and an indication of the modem's error correction and data compression. Check dial tone before proceeding dialing, ignore busy tone detection.
X3	Display connect message and the modem's data rate, and an indication of the modem's error correction and data compression. Ignore dial tone before proceeding dialing, check busy tone after making dialing.
X4 *	Display connect message and the modem's data rate, and an indication of the modem's error correction and data compression. Check dial tone and busy tone.
X5	Same as X4.
X6	Same as X4.

X7	Display CONNECT or "1" for all speeds. Check dial tone and busy tone.
Zn	Recall stored profile.
Z0	Reset and recall user profile 0. Either Z0 or Z1 restores the same single profile.

Extended "AT&" (Ampersand) Command Set (* indicates factory default setting)

Command Function

&Cn	Data carrier detect option
&C0	State of carrier from remote modem is ignored. DCD circuit is always on.
&C1 *	DCD turns on when the remote modem's carrier signal is detected, and off when the carrier signal is not detected.
&Dn	Data Terminal Ready (DTR) option
&D0	DTR ignored
&D1	Go to command mode on on-to-off DTR transition.
&D2 *	Hang up and go to command mode on on-to-off DTR transition. Auto-answer is disabled if DTR is low.
&D3	Hang up and reset from user profile 0 on the on-to-off DTR transition.
&F	Recall factory default setting as active configuration.
&Gn	V.22bis guard tone option
&G0 *	No guard tone
&G1	550 Hz guard tone
&G2	1800 Hz guard tone
&Kn	Set local flow control
&K0	Disable flow control
&K3 *	Enable bi-directional hardware flow control (CTS/RTS).
&K4	Enable bi-directional software flow control (XON/XOFF).
&Pn	Pulse dialing make/break ratio selection
&P0	Make=39%, Break=61%, international version (Default) Make=33%, Break=67% for use in 20 pps, Japanese version
&P1	Make=33%, Break=67%, international version Make=33%, Break=67% for use in 10 pps, Japanese version (Default)
&Qn	Async communications mode options
&Q0	Async mode, buffered (same as "AT\N0")
&Q5 *	Error control mode, buffered (same as "AT\N3")
&Q8	MNP error control mode. If an MNP error control protocol is not established, the modem will fallback according to the current setting in S36 register.
&Q9	V.42 or MNP error control mode. If neither error control protocol is established, the modem will fallback according to the current setting in S36 register.
&Sn	Data Set Ready (DSR) option

&S0 *	DSR always on
&S1	DSR on during handshake and on-line, off in test mode or idle mode
&Tn	Self-test commands
&T0	Terminate any test in progress
&T1	Local analog loopback test
&T3	Local digital loopback (LDL) test
&T6	Remote digital loopback test, in normal mode
&V	View active file and stored phone numbers
&W	Store active configuration into the modem's NVRAM
&Zn=x	Store telephone number (n=0 to 3; x=<string>) (see also the dial modifier in "ATDn" command). The max. number of digits per string is 40.

Extended "AT" (Back Slash) Command Set (* indicates factory default setting)

Command Function

\Jn	Constant DTE speed option
\J0 *	DCE and DTE rates are independent
\J1	Force the DTE interface speed to the DCE connection rate (line speed) after on-line
\Nn	Error control mode options
\N0	Buffered mode, no error control (flow control is allowed).
\N1	Direct mode, no error control (no flow control is allowed).
\N2	MNP reliable mode. If MNP 2-4 error control establishment fails, the modem disconnects.
\N3 *	V.42, MNP or buffer mode. The modem attempts to connect in V.42 mode. If this fails, the modem attempts to connect in MNP mode. If this fails, the modem connects in buffer mode.
\N4	V.42 or disconnect. The modem attempts to connect in V.42 mode. If this fails, the call will be disconnected.
\Qn	Local flow control options
\Q0	Disable flow control (same as "AT&K0")
\Q1	XON/XOFF software flow control (same as "AT&K4")
\Q3 *	RTS/CTS hardware flow control (same as "AT&K3")
\Tn	Set inactive timer (for buffer mode only) n=0 * Disable inactive timer n=1-255 Enable inactive timer. Length in minutes
\Vn	Protocol result codes
\V0	Disable protocol result code appended to DCE speed.
\V1 *	Enable protocol result code appended to DCE speed.

Extended “AT%” (Percent) Command Set (* indicates factory default setting)

Command Function

%B View numbers in blacklist. If blacklisting is in effect, this command displays the numbers for which the last call attempted in the past two hours failed. The ERROR result code appears in the countries that do not require blacklisting. %Cn Data compression control

%C0 No data compression

%C1 * V.42bis/MNP 5 data compression enabled.

*

Extended “AT-” (Dash) Command Set (* indicates factory default setting)

Command Function

-Cn Data calling tone options

-C0 * Disable data calling tone

-C1 Enable data calling tone (the freq. is 1,300 Hz with a cadance of 0.5 sec. ON and 2 sec. OFF)

Result Codes

In command mode your modem can send responses called *result codes* to your computer. Result codes are used by communications programs and can also appear on your monitor.

Terse	Verbose	Description
0	OK	Command executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal lost or not detected
4	ERROR	Invalid command
5 *	CONNECT 1200	Connected at 1200 bps
6	NO DIALTONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	No answer at remote end
10*	CONNECT 2400	Connected at 2400 bps
11*	CONNECT 4800	Connected at 4800 bps
12*	CONNECT 9600	Connected at 9600 bps
13*	CONNECT 14400	Connected at 14400 bps
14*	CONNECT 19200	Connected at 19200 bps
24*	CONNECT 7200	Connected at 7200 bps
25*	CONNECT 12000	Connected at 12000 bps
26*	CONNECT 16800	Connected at 16800 bps
40*	CONNECT 300	Connected at 300 bps
55*	CONNECT 21600	Connected at 21600 bps
56*	CONNECT 24000	Connected at 24000 bps
57*	CONNECT 26400	Connected at 26400 bps
58*	CONNECT 28800	Connected at 28800 bps
59*	CONNECT 31200	Connected at 31200 bps
60*	CONNECT 33600	Connected at 33600 bps
70*	CONNECT 32000	Connected at 32000 bps, 56K rate
71*	CONNECT 34000	Connected at 34000 bps, 56K rate
72*	CONNECT 36000	Connected at 36000 bps, 56K rate
73*	CONNECT 38000	Connected at 38000 bps, 56K rate
74*	CONNECT 40000	Connected at 40000 bps, 56K rate
75*	CONNECT 42000	Connected at 42000 bps, 56K rate
76*	CONNECT 44000	Connected at 44000 bps, 56K rate
77*	CONNECT 46000	Connected at 46000 bps, 56K rate
78*	CONNECT 48000	Connected at 48000 bps, 56K rate
79*	CONNECT 50000	Connected at 50000 bps, 56K rate
80*	CONNECT 52000	Connected at 52000 bps, 56K rate
81*	CONNECT 54000	Connected at 54000 bps, 56K rate
82*	CONNECT 56000	Connected at 56000 bps, 56K rate
88	DELAYED	Delay is in effect for the dialed number
89	BLACKLISTED	Dialed number is blacklisted
90	BLACKLIST FULL	Blacklist is full
100	CONNECT 28000	Connected at 28000 bps, V.90 rate
101	CONNECT 29333	Connected at 29333 bps, V.90 rate
102	CONNECT 30666	Connected at 30666 bps, V.90 rate
103	CONNECT 33333	Connected at 33333 bps, V.90 rate
104	CONNECT 34666	Connected at 34666 bps, V.90 rate
105	CONNECT 37333	Connected at 37333 bps, V.90 rate
106	CONNECT 38666	Connected at 38666 bps, V.90 rate
107	CONNECT 41333	Connected at 41333 bps, V.90 rate
108	CONNECT 42666	Connected at 42666 bps, V.90 rate
109	CONNECT 45333	Connected at 45333 bps, V.90 rate
110	CONNECT 46666	Connected at 46666 bps, V.90 rate
111	CONNECT 49333	Connected at 49333 bps, V.90 rate
112	CONNECT 50666	Connected at 50666 bps, V.90 rate
113	CONNECT 53333	Connected at 53333 bps, V.90 rate
114	CONNECT 54666	Connected at 54666 bps, V.90 rate

* EC is added to these result codes when the extended result codes configuration option is enabled. EC is replaced by one of the following codes, depending on the type of error control connection:

V42bis —V.42 error control (LAP-M) and V.42bis data compression

V42 —V.42 error control (LAP-M) only

MNP5 —MNP 4 error control and MNP 5 data compression

MNP4 —MNP 4 error control only

NoEC —No error control protocol).

S-Registers

S-Registers are accessed using the **S** command (**ATS n = x**). The S-Registers supported by the MT5634ZLX/FE are described below.

S-Reg.	Values	Default	Description
S0=	0 - 255	000	S0 sets the number of the rings required before the modem automatically answers a call. Set S0=0" to disable auto-answer mode.
S1=	0 - 255	000	S1 counts the incoming rings and stores the value to this register. The value of this register is incremented with each ring. If no rings occur over an 8 sec. interval, this register is cleared. User can read but should not change this value.
S2=	0 - 255	043	S2 holds the decimal value of the ASCII character used as the escape character. The default value (043) corresponds to an ASCII character "+". A value of 128 to 255 disables the escape process (i.e., no escape character is recognized).
S3=	0 - 127	013	S3 holds the decimal value of the Carriage Return <CR> character used as the command line and result code terminator. Pertains to asynchronous operation only.
S4=	0 - 127	010	S4 holds the decimal value of the character recognized as a line feed. The line feed control character is output after the carriage return control character if verbose result code are used.
S5=	0 - 32,	127	S5 holds the decimal value of the character recognized as a backspace. The modem will not recognize the backspace character if this register is set to a value greater than 32008.
S6=			S6 sets the length of time, in seconds, that the modem must wait (minimum 2 seconds even if the value is less than 2) after going off-hook before dialing the first digit of the telephone number.
	2 - 65		For international version 002
	4 - 65		For Japanese version 004
S7=			S7 sets the time, in seconds, that the modem must wait before hanging up because carrier is not detected
	1 - 255		For international version 050
	35 - 59		For Japanese version 050
S8=	0 - 65	002	S8 sets the time, in seconds, that the modem must pause when the ",", dial modifier is encountered in the dial string.
S10=	1 - 255	020	S10 sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier.
S11=	50 - 150	095	S11 sets the DTMF duration and inter digit delay. Sets the duration and spacing, in mini-seconds, in DTMF touch tone dialing.
S28=	0 - 255	001	V.34 modulation enable/disable: 0: disabled 1- 255: enabled

S30=	0 - 90	000	Inactivity timer. S30 sets length of time, in minutes, that the modem counts when there is no data flow in or out the DTE serial port. A connection is disengaged when the counter reaches the preset value. Set S30 =0 to disable inactivity timer. For buffer mode only.																																										
S36=	0-7	007	<p>Negotiation fallback options:</p> <ul style="list-style-type: none"> 0, 2 Hang up 1, 3 Fall back to an async connection 4, 6 Attempt MNP mode. If MNP fails, hang up. 5, 7 Attempt MNP mode. If MNP fails, fallback to async connection. 																																										
S37=	0-19	000	<p>S37 sets the desired DCE speed (line speed):</p> <ul style="list-style-type: none"> 0 Maximum modem speed 2 Attempt 1200/75 bps connection 3 Attempt to a 300 bps connection 5 Attempt to a 1200 bps connection 6 Attempt to a 2400 bps connection 7 Attempt to a 4800 bps connection 8 Attempt to a 7200 bps connection 9 Attempt to a 9600 bps connection 10 Attempt to a 12000 bps connection 11 Attempt to a 14400 bps connection 12 Attempt to a 16800 bps connection 13 Attempt to a 19200 bps connection 14 Attempt to a 21600 bps connection 15 Attempt to a 24000 bps connection 16 Attempt to a 26400 bps connection 17 Attempt to a 28800 bps connection 18 Attempt to a 31200 bps connection 19 Attempt to a 33600 bps connection 																																										
S38=	0-23	001	<p>Sets "downstream" data rate where K56flex provides rates of 32,000 to 56,000 in 2,000 bps increments, V.90 provides rates of 28,000 to 56,000 bps in increments of 1,333 bps.</p> <table border="0" style="width: 100%;"> <tr> <td>0 = V.90 disabled</td> <td></td> </tr> <tr> <td>1 = V.90 autorate</td> <td><u>K56flex rates</u></td> </tr> <tr> <td>2 = 28,000 bps</td> <td>2 = 32,000 bps</td> </tr> <tr> <td>3 = 29,333 bps</td> <td>3 = 34,000 bps</td> </tr> <tr> <td>4 = 30,666 bps</td> <td>4 = 36,000 bps</td> </tr> <tr> <td>5 = 32,000 bps</td> <td>5 = 38,000 bps</td> </tr> <tr> <td>6 = 33,333 bps</td> <td>6 = 40,000 bps</td> </tr> <tr> <td>7 = 34,666 bps</td> <td>7 = 42,000 bps</td> </tr> <tr> <td>8 = 36,000 bps</td> <td>8 = 44,000 bps</td> </tr> <tr> <td>9 = 37,333 bps</td> <td>9 = 46,000 bps</td> </tr> <tr> <td>10 = 38,666 bps</td> <td>10 = 48,000 bps</td> </tr> <tr> <td>11 = 40,000 bps</td> <td>11 = 50,000 bps</td> </tr> <tr> <td>12 = 41,333 bps</td> <td>12 = 52,000 bps</td> </tr> <tr> <td>13 = 42,666 bps</td> <td>13 = 54,000 bps</td> </tr> <tr> <td>14 = 44,000 bps</td> <td>14 = 56,000 bps</td> </tr> <tr> <td>15 = 45,333 bps</td> <td></td> </tr> <tr> <td>16 = 46,666 bps</td> <td></td> </tr> <tr> <td>17 = 48,000 bps</td> <td></td> </tr> <tr> <td>18 = 49,333 bps</td> <td></td> </tr> <tr> <td>19 = 50,666 bps</td> <td></td> </tr> <tr> <td>20 = 52,000 bps</td> <td></td> </tr> </table>	0 = V.90 disabled		1 = V.90 autorate	<u>K56flex rates</u>	2 = 28,000 bps	2 = 32,000 bps	3 = 29,333 bps	3 = 34,000 bps	4 = 30,666 bps	4 = 36,000 bps	5 = 32,000 bps	5 = 38,000 bps	6 = 33,333 bps	6 = 40,000 bps	7 = 34,666 bps	7 = 42,000 bps	8 = 36,000 bps	8 = 44,000 bps	9 = 37,333 bps	9 = 46,000 bps	10 = 38,666 bps	10 = 48,000 bps	11 = 40,000 bps	11 = 50,000 bps	12 = 41,333 bps	12 = 52,000 bps	13 = 42,666 bps	13 = 54,000 bps	14 = 44,000 bps	14 = 56,000 bps	15 = 45,333 bps		16 = 46,666 bps		17 = 48,000 bps		18 = 49,333 bps		19 = 50,666 bps		20 = 52,000 bps	
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21 = 53,333 bps

22 = 54,666 bps

23 = 56,000 bps

Upstream data rates

Upstream V.90 data rates are 4800 to 33,600 bps in 2400 bps increments.

S48=	7, 128	S48 sets the LAPM error control and feature negotiation:
	S48=7	Negotiation enabled
	S48=128	Negotiation disabled. Force immediate fallback options specified in S36
	S36=0 or 2, and S48=7	LAPM or hang up
	S36=0 or 2 and S48= 128	Do not use
	S36=1 or 3, and S48=7	LAPM or async
	S36=1 or 3, and S48=128	Async
	S36=4 or 6, and S48=7	LAPM, MNP or hang up
	S36=4 or 6, and S48=128	MNP or hang up
	S36=5 or 7, and S48=7	LAPM, MNP or async
	S36=5 or 7, and S48=128	MNP or hang up
S89=	0, 5 - 60 030	S89 sets the Sleep Mode control timer. Specify the number of seconds of inactivity (no character sent from DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of "0" prevents standby mode. If a number between 1 and 4 is entered for this register, it will set the value to 5.
S91=		Transmit power level adjustment (Japanese version only): Range: -6 dBm to -15 dBm Default: -15 dBm 014
S109	0--2 1	Sets one of three 56K operating modes: K56flex mode, V.90 mode, or Auto-mode. S109=2 forces V.90 connections for testing purposes, etc. S109 sets the 56K operating mode as shown below: 0 = V.90 disabled 1 = K56flex or V.90 (Dual mode enabled) 2 = V.90 only (K56flex disabled).



Chapter 4 - Remote Configuration

Introduction

Remote configuration is a network management tool that allows you to configure modems anywhere in your network from one location. With password-protected remote configuration, you can issue AT commands to a remote MT5634ZLX/FE modem for maintenance or troubleshooting as if you were on-site.

Basic Procedure

The following steps are valid regardless of whether the connection is established by the local or the remote Multi-Tech modem.

1. Establish a data connection with a remote MT5634ZLX/FE modem.
2. Send three remote configuration escape characters followed by **AT** and the setup password, and press ENTER. Example: **%%%ATMTSMODEM<CR>**. You have four tries to enter the correct password before being disconnected. If the password is correct, the remote modem responds with
OK
3. You can now send AT commands to configure the remote modem.
4. When you have finished configuring the remote modem, save the new configuration by typing **AT&W0<CR>**, then type **ATO<CR>** to exit remote configuration. You can then break the connection in the normal way.

CAUTION: If you hang up while you are in remote configuration mode, it may lock up the remote modem.

Setup

Multi-Tech modems are shipped with a default setup password (MTSMODEM). Because anyone who has an owner's manual knows the default setup password, you should change the password for security reasons and, possibly, the remote configuration escape character.

Changing the Setup Password

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#SMTSMODEM** (or **AT#Syyyyyy** if you have replaced the MTSMODEM password with yyyyyy) and press ENTER. The modem responds with **OK** if the setup password is correct, and **ERROR** if it is wrong.
3. To change the password, type **AT#S=yyyyyy**, where yyyyyy stands for the password, and press ENTER. The password can include any keyboard character, and must be one to eight characters long. The modem responds with **OK**.
4. The new password is saved automatically. You can now either enter more AT commands or exit the data communications program. The next time you remotely configure the modem you must use the new setup password.

Note: You can only change the setup password locally; you cannot do it remotely. Also, passwords are case sensitive. The next time you enter the password, it must be in the same case as you set it up.

Changing the Remote Escape Character

To increase security, you can change a remote modem's remote configuration escape character. The remote configuration escape character is stored in register **S9**. The factory default is 37, which is the ASCII code for the percent character (%). Setting **S9** to 0 (zero) disables remote configuration entirely—but if you do this remotely, you won't be able to change it back remotely!

1. Establish a remote configuration link with the remote modem as described in "Basic Procedure."
2. Type **ATS9=*n***, where *n* is the ASCII code for the new remote configuration escape character, then press ENTER.
3. Save the new value by typing **AT&W** and clicking ENTER.
4. Type **ATO<CR>** to exit remote configuration.



Chapter 5 - Troubleshooting

Introduction

This chapter provides general and specific problem solving steps. Below are a number of examples of Problems (**P:**), Causes (**C:**), and Solutions (**S:**). If your MT5634ZLX/FE is not working properly, look up the problem and solution here; if unsuccessful, call Tech Support. At the end of this chapter, there are some specific steps for resolving IRQ and COM port conflicts.

P: No Response to AT Commands

- C:** The COMx port that the modem is set to may be used by another card in the computer.
- S:** Change the COMx port of MT5634ZLX/FE to a different unused port. It might be best to set it to COM3 or COM4. Even if you are not using a serial port which is set to the same COMx port as the modem, it can still interfere with the modem. Be sure to update your software COMx port setting as well.
- C:** The Interrupt that the modem is using may be the same Interrupt that another card is using.
- S:** Change the IRQ settings to a different, unused, IRQ. Even if you are not using a serial port which is set to the same IRQ as the modem, it can still interfere with the modem.

P: The Modem Does Not Execute the Command Line

- C:** Make sure you are typing '**AT**' at the beginning of command line (and hit Enter at the end).
- C:** Make sure the modem is not in Data Mode. Type **+++** if necessary.
- C:** Make sure your software is set to the same COMx port as your MT5634ZLX/FE.

P: The Modem Does Not Give a Response After an AT Command Was Executed

- C:** The echo and/or responses may be turned off by the **ATE0Q1** commands. Enable the **AT&V1** to check Result Codes.
- S:** Use **ATE1Q0** then Enter to change them back.
- C:** Make sure the modem is in Command Mode and not Data Mode when you type the AT command.

P: The Modem Gives an 'ERROR' Response After an AT Command was Executed

- C:** Make sure you did not type an invalid command.
- C:** Make sure your command line is 40 characters or less.

P: The Modem Goes Off-Hook and Disables the Telephone Line.

- C:** The modem may be set to auto-answer the phone when it rings.
- S:** Disable auto-answer by typing **ATS0=0** then Enter at the command line.

P: The Modem Does Not Auto-Answer the Phone

- C:** If necessary, make sure the software is configured to auto-answer the phone.
- A:** To set auto-answer mode on from AT command mode, type **ATS0=n** then click Enter. The **n** stands for which number of rings the modem answers. For example: **ATS0=3** causes the modem to answer on the third ring.

P: The Software Does Not Control the Modem Properly or Can Not Detect the Modem

- S:** Make sure the software was set up correctly. Check the initialization string and dial string.
- C:** Some TSRs (programs that stay in memory after they are loaded) may conflict with the communications software.
- S:** Try starting your computer without loading any TSRs.

P: The Characters on the Screen Are Doubled

C: Both the modem and the software have the echo feature turned on.

S: Since only one needs an echo, turn the software echo feature off.

C: The remote modem is echoing your typed characters.

S: Type **ATE1** then Enter at the command line. Then turn off the software echo feature.

P: No Text Appears on the Screen in Data Mode

C: The remote modem is not echoing your typed characters.

S: Type **ATE0** then click Enter at the command line. Then turn the software echo feature on.

C: Your software may not be set to use Full Duplex or the remote modem may not be set to use Full Duplex either.

C: The remote modem may be waiting for you to type a command before it will reply with text.

P: No Text Appears on the Screen When in Command Mode

S: If you can't see the characters you are typing, then type **ATE1** then click Enter.

P: The Modem Does Not Dial a Phone Number After Execution of AT Dial Command

C: If you use touch tone dialing on a phone line that requires pulse dialing, then it may not work.

S: Use **ATDT** in place of **ATDP**.

P: Communications Software Dials, but Fails

C: Make sure the software dialing prefix is **ATDT**.

C: Make sure the software and modem are set to the same COMx port.

C: The modem may not have hung up the phone line since the last call.

S: Change to Command mode and type **ATH** then click Enter.

P: The Modem Connects with Some Modems, but Not with Others

C: The remote modem may not support data compression or error correction, which might cause it to take too long to negotiate a link.

S: You might try changing the way the modem negotiates by using the **AT&Qn**, **ATNn**, and **ATS37=n** commands. It might be best to start with **AT&Q0N1**.

P: When Dialing Another Modem, You Receive a 'CONNECT' Response, but Nothing Else

C: The remote modem may be waiting for you to type a command.

S: Try to log on to the remote site (click Enter).

S: Type an AT command, then click Enter.

P: The Modem Speaker Does Not Make Any Sound When Connecting to Another Modem

C: The software may have the speaker disabled.

S: Change the setting in your software or use the **ATMn** command to turn the speaker on.

P: The Modem Loses the Connection When in Use

C: The remote modem may have locked up.

S: Run the Remote Digital Loopback Test (**&T4** command).

C: The telephone switch may have disconnected your call.

- C: Your software may have turned off the DTR signal.
- P: The Modem Does Not Connect with Another Modem**
- C: There may be a problem with the remote modem if you do not hear the high pitched tone from the remote modem.
- S: Run the Remote Digital Loopback Test (**&T4** command).
- P: Occasionally, the Modem Gives a Burst of Errors.**
- C: The telephone line may be noisy or bad.
- S: Hang up the call and try to connect again for getting a better telephone line.
- C: If there are other telephones on the same line that your modem is using, someone may have picked up a telephone on that extension.
- C: Your telephone line may have the call waiting feature.
- S: Try adding ***70** to your **ATDT** dialing command line. If it doesn't help, ask your telephone company how to temporarily disable call waiting.
- P: The Modem Gets Random Errors in Transmitted Data.**
- S: Try to use V.42 or MNP1-4 if possible.
- S: Connect the modems at a slower baud rate.
- P: After Downloading a File, the File Does Not Store on Your Disk Drive**
- C: If both modems are using MNP or V.42 protocol, then flow control may not be enabled.
- S: Configure your software to use RTS/CTS flow control to cause your computer to pause long enough for the file to be stored to disk.
- P: The Text on the Screen Is Not Legible**
- C: Your software settings may not match the settings of the remote device.
- S: Make sure your data bits, stop bits, and parity settings match the settings that the other computer is using. The two most common settings are: 8 data bits, None parity, and 1 stop bit (8,N,1) or 7 data bits, Even parity, and 1 stop bit (7,E,1).
- C: If the telephone line is very noisy, you may see corrupted data on your screen.
- C: Due to poor telephone line conditions, the modem may have fallen back to a slower communication speed. You may need to change the baud rate setting in your software to match this slower speed. To return the modem to the higher speed, disconnect the link and re-establish again.
- P: When Using V.42bis or MNP5, Some Features Are Disabled**
- C: You may be using a non-streaming protocol, like Xmodem or Ymodem to transfer files. Those are fine unless you are using V.42bis or MNP5
- S: When using V.42bis or MNP5, you should use a streaming transfer protocol like Ymodem-G or Zmodem.
- S: Configure your software to use hardware flow control (RTS/CTS ON).
- Q: When Connecting to Another Modem, the Modem Reports a Higher Connect Baud Rate than it Is Really Using
- C: The modem defaults to report the modem-to-computer baud rate when it responds with *CONNECT*.

S: Go to Command mode with your communication program (like Telix) and type **ATW2**, then click Enter. This tells the modem to report the modem-to-modem baud rate instead.

P: When I Run CARDEN, “PC-Card Is Not Enabled Successfully” Is Displayed

C: Your computer does not have enough memory to map the attribute memory of your MT5634ZLX/FE.

S: If memory management software (e.g., EMM386) is installed, you must reserve an area in upper memory (C000:0 — EFFF:F) for MT5634ZLX/FE attribute memory when enabling the card.

Example: *Device=C:\DOS\EMM386.EXE RAM X=D000-D3FF*

Reserve D000 - D3FF for attribute memory.

C: No free I/O space or interrupt request can be assigned to the MT5634ZLX/FE.

S: The MT5634ZLX/FE needs 32 contiguous I/O ports and one interrupt request for its LAN connection. It also need 8 contiguous I/O ports and another interrupt request for Fax/Modem. The LAN ports must be located at one of the following I/O addresses: 0x300, 0x320, 0x340, 0x360. The Fax/Modem ports must be located at one of these addresses: 0x2F8, 0x3E8, 0x3E8. (There are also compatibility issues with certain Fax/Modem software applications.) We recommend assigning the Modem Interrupt (MIR) a value less than 7 (IRQ3 to 6). Make sure that these resources are available for the MT5634ZLX/FE.

P: Enabling The MT5634ZLX/FE

S: If the Card Service is installed, you can check by hearing the beep when card insertion.

S: Run **CARDEN /CHK** to check if the MT5634ZLX/FE has been enabled. The resources allocated for the card are shown as below at the last line of the display message.

IOP=0Xnnn IRQ=nn COM=nn MIR=nn

P: Installing The Win 95 Driver Over SystemSoft CardWorks

- S:**
1. Start Windows 95, then plug the MT5634ZLX/FE into the PCMCIA slot. The SystemSoft Cardwizard window should appear.
 2. Select the appropriate slot number containing the MT5634ZLX/FE.
 3. Select the **View** pull down menu
 4. Select **Properties**.
 5. Select **Drivers** in **Properties**.
 6. Select **Change Card Driver** to active the selective items above it.
 7. Select **Use Plug and Play**.
 8. Click **OK**. Windows 95 will ask you to remove the card.
 9. Insert the card again.
 10. Follow the instruction to insert the diskette and type the path **A:** for the MT5634ZLX/FE driver.
 11. Add client and service as desired at the **Network** icon in **Control Panel**.
 12. Reboot the computer.

P: The NetWare Driver Runs Successfully but Fails to Login to The NetWare Server

C: The client Frame type is incompatible with the server Frame type.

S: The default frame type for Netware 3.11 and below is 802.3 but it changed to 802.2 in Netware 4.x and 3.12. Check the content of NET.CFG to see if the Frame type is acceptable by the server. If the Frame type can not be accepted by the server, edit NET.CFG to change the Frame type at the client site, or add the Frame type which can be accepted at the server site.

COM Port and IRQ Conflicts

If you have isolated the problem to an IRQ or COM port conflict, refer to the following sections for resolving IRQ and COM port conflicts in Windows 3.1x, Windows 95, Windows 98, or WindowsNT.

Windows 3.1x

To look for COM port or IRQ conflicts in Windows 3.1x, select File | Run in Program Manager, type **MSD**, and click Enter. Then select *Mouse*, *COM Ports*, and *IRQ Status* and note the addresses and IRQs that are in use. If you find an IRQ conflict, note which IRQs are not being used, then change one of the conflicting devices to use one of the unused IRQs. If you find an address conflict, change the address of one of the conflicting devices.

To change a port address or IRQ in Windows 3.1x, double-click the *Control Panel* icon, then the *Ports* icon. Click on the port you want to change, click *Settings*, click *Advanced*, and select the new port address and/or interrupt. If you wish to use COM3 or COM4, note that COM3 shares an IRQ with COM1, as does COM4 with COM2, so you should change their IRQs to unused ones, if possible.

Windows 95

Windows 95 provides a complete "Plug n' Play" System that will automatically recognize and configure most PC Cards.

As Multifunction PC Cards put a heavy demand on a system's resources, please resolve all system conflicts, errors, and Windows 95 issues before installing the MT5634ZLX/FE.

In Windows 95, right-click on **My Computer**, select **Properties** from the menu, click on the **Device Manager** tab, double-click on **Ports**, then double-click on the **Communications Port** your modem is connected to. In the port's **Properties** sheet, click on the **Resources** tab to see the port's Input/Output range and Interrupt Request. If another device is using the same address range or IRQ, it will appear in the **Conflicting Device List**. Uncheck **Use Automatic Settings** to change the port's settings so they do not conflict with the other device, or select the port the conflicting device is on and change it instead. If you need to open your computer to change switches or jumpers on the conflicting device, refer to the device's documentation.

If the **New Hardware Found** dialog box doesn't appear.

1. Run *REGEDIT* .
2. Select **HKEY_LOCAL_MACHINE**
3. Select **Enum** .
4. Select **PCMCIA** .
5. Highlight the folder **MultiMobile-MT5634ZLX-FE-XXXX** .
6. Click the *Delete* key to delete the association.

Windows 98

Windows 98 provides a complete "Plug n' Play" System that will automatically recognize and configure most PC Cards.

As Multifunction PC Cards put a heavy demand on a system's resources, please resolve all system conflicts, errors, and Windows 98 issues before installing the MT5634ZLX/FE.

In Windows 98, right-click on **My Computer**, select **Properties** from the menu, click on the **Device Manager** tab, double-click on **Ports**, then double-click on the **Communications Port** your modem is connected to. In the port's **Properties** sheet, click on the **Resources** tab to see the port's Input/Output range and Interrupt Request. If another device is using the same address range or IRQ, it will appear in the **Conflicting Device List**. Uncheck **Use Automatic Settings** to change the port's settings so they do not conflict with the other device, or select the port the conflicting device is on and change it instead. If you need to open your computer to change switches or jumpers on the conflicting device, refer to the device's documentation.

If the **New Hardware Found** dialog box doesn't appear.

1. Run *REGEDIT*.
2. Select **HKEY_LOCAL_MACHINE**.
3. Select **Enum**.
4. Select **PCMCIA**.
5. Highlight the folder **MultiMobile-MT5634ZLX-FE-XXXX**.
6. Click the *Delete* key to delete the association.

Windows NT 3.51 and NT 4.0

Windows NT provides support for PC Card (PCMCIA) compatible systems. Do not run any of the MT5634ZLX/FE install programs as they are unnecessary for the NT environment. Multifunction PC Cards put a heavy demand on a system's resources. Please resolve all system conflicts, errors, and Windows NT issues before installing the MT5634ZLX/FE.

Note: running Windows NT 4.0 with Service Pack 1 may cause some portable PCs to hang up on Shutdown or Restart. If this occurs, please update to Service Pack 3 (or higher).

Additional References

The World Wide Web is an excellent source of information about modems in general and modem installation, configuration, and troubleshooting in particular. The following Web sites are good places to start:

- Costmo's Other Resources Page:
<http://modems.rosenet.net/or/>
- Curt's High Speed Modem Page:
<http://elaine.teleport.com/~curt/modems.html>
- Data Communications FAQ:
<http://www.best.com/~malch/comfaq.html>
- The PC Guide:
<http://www.pcguide.com>
- Multi-Tech Systems, Inc.:
<http://www.multitech.com/>



Appendices

Appendix A: Regulatory Compliance

Class B Statement

FCC Part 15

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference that may cause undesired operation.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

FCC Part 68 Telecom

1. This equipment complies with part 68 of the Federal Communications Commission Rules. On the outside surface of this equipment is a label that contains, among other information, the FCC registration number. This information must be provided to the telephone company.
2. As indicated below, the suitable jack (Universal Service Order Code connecting arrangement) for this equipment is shown. If applicable, the facility interface codes (FIC) and service order codes (SOC) are shown.
3. A FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant. See installation instructions for details.
4. The ringer equivalence number (REN) is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the device not ringing in response to an incoming call. In most , but not all areas, the sum of the REN's should not exceed (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total REN's, contact the local telephone company.
5. If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
6. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications in order to maintain uninterrupted service.
7. If trouble is experienced with this equipment (the model of which is indicated below) please contact MultiTech Systems, Inc. at the address shown below for details of how to have repairs made. If the equipment is causing harm to the network, the telephone company may request you to remove the equipment from the network until the problem is resolved.
8. No repairs are to be made by you. Repairs are to be made only by MultiTech Systems or its licensees. Unauthorized repairs void registration and warranty.
9. This equipment should not be used on party lines or coin lines.
10. If so required, this equipment is hearing-aid compatible.

Manufacturer:	MultiTech Systems, Inc.
Trade Name:	MultiMobile
Model Number:	MT5634ZLX/FE
FCC Registration Number:	AU7USA-32497-M5-E
Ren:	0.4B
Modular Jack (USOC):	RJ11C or RJ11W
Service Center in USA:	MultiTech Systems, Inc. 2205 Woodale Drive Mounds View, MN 55112 (612) 785-3500 Fax (612) 785-9874

FAX Branding Statement

The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device, including fax machines, to send any message unless such message clearly contains the following information:

- Date and time the message is sent
- Identification of the business or other entity, or other individual sending the message
- Telephone number of the sending machine or such business, other entity, or individual

This information is to appear in a margin at the top or bottom of each transmitted page or on the first page of the transmission. (Adding this information in the margin is referred to as *fax branding*.)

Since any number of Fax software packages can be used with this product, the user must refer to the Fax software manual for setup details. Typically the Fax branding information must be entered via the configuration menu of the software.

Canadian Limitations Notice:

RINGER EQUIVALENCE NUMBER

NOTICE: The ringer equivalence number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the ringer equivalence numbers of all the devices does not exceed 5.

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.



EMC, Safety and Terminal Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility.

and

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits:

and

Council Directive 98/13/EEC of 12 March 1998 on the approximation of the laws of Member States concerning telecommunications and Satellite earth station equipment.

Commission Decision "CTR21"

The equipment has been approved to [Commission Decision "CTR21"] for pan-European single terminal connection to the Public Switched Telephone Network (PSTN). However, due to differences between the individual PSTNs provided in different countries, the approval does not, of itself, give an unconditional assurance of successful operation on every PSTN network termination point.

This equipment is designed to work with PSTN networks that accept analog signals. Multi-Tech does not currently know of any interoperating difficulties.

In the event of problems, you should contact your equipment supplier in the first instance.

New Zealand Telecom Warning Notice

Use of pulse dialing, when this equipment is connected to the same line as other equipment, may give rise to 'bell tinkle' or noise and may also cause a false answer condition. Should such problems occur, the user should NOT contact the Telecom Faults Service.

The preferred method of dialing is to use DTMF tones, as this is faster than pulse (decadic) dialing and is readily available on almost all New Zealand telephone exchanges.

Warning Notice: No '111' or other calls can be made from this device during a mains power failure.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national telecom requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

Appendix B - V.90 Support

Introduction

V.90 is the ITU designation for what had formerly been called V.pcm. The ITU recommendation V.90 was determined at a meeting in Geneva ending February 6, 1998.

V.90 will replace K56flex and other proprietary solutions for PCM connections. Dual-mode client modem code will be important until all central-site digital modems are upgraded to V.90 and all interoperability problems have been resolved. Until that time, the Dual-mode client code will provide reliable connections in K56flex mode to the central-site modems currently deployed.

Your V.90 dual-mode (V.90/K56flex) modem now includes:

- New AT commands (**+MS=12, AT!**),
- New Result Codes in V.90 mode, and

These new functions are explained in documents that are readily-available on the Multi-Tech web site in Portable Document Format (PDF) files at <http://www.multitech.com/support/manuals/IDCfiles/manuals.idc> . You can download the Acrobat Reader to view PDF files (you may want to bookmark <http://www.adobe.com/prodindex/acrobat/readstep.html> before following the “download” link). For files with a .ZIP extension, you can download PKUNZIP.EXE to extract the zipped files from the Multi-Tech FTP site at: <ftp://ftp.multitech.com/Utilities/PKUNZIP.EXE>. Using your favorite Web browser, go to <http://www.multitech.com/support/V.90upgrades.htm> for additional information on ITU V.90 support and other Multi-Tech products.

V.90 Troubleshooting

1. Check if the modem firmware is the latest. If not, download the latest from <ftp://ftp.multitech.com>.
2. Try adding one or more comma (,) characters to the dialed number in the dialing string.
3. Try limiting the speed with the **S37** (sets the maximum upstream speed) and **S38** (sets the maximum “downstream speed) commands.
4. Perform basic modem/line troubleshooting (check the phone line for noise, try a different line, try another device on the same line, etc.

Appendix C: Comprehensive Driver Notes

Introduction

This appendix provides general and specific information on the MT5634ZLX/FE software drivers.

Notes for NDIS Driver

The following are examples of CONFIG.SYS file and AUTOEXEC.BAT for loading System Soft Card Services and NDIS2 driver:

Examples of CONFIG.SYS file:

```
device=c:\cardsoft\ss365sl.exe
device=c:\cardsoft\cs.exe
device=c:\cardsoft\csalloc.exe c:\cardsoft\csalloc.ini
device=c:\lanman.dos\drivers\Ethernet\lmndis\carden.exe /iop=nnn /irq=n /com=n /mir=n
device=c:\cardsoft\cardid.exe
device=c:\lanman.dos\deivers\protman.dos /i:c:\lanman.dos
device=c:\lanman.dos\drivers\Ethernet\lmndis\lmndis.dos
```

Examples of partial AUTOEXEC.BAT file:

```
set path= c:\lanman.dos\netprog;%path%
net start workstation
load netbeui
```

The 10/100 Fast Ethernet function configuration information for the DOS NDIS driver is contained in the PROTOCOL.INI file. To make allowances for passing the requested modem COM port (1,2,3,4) to the driver, there has been another field added. The section of the PROTOCOL.INI file that contains configuration information for this card must begin with **[LMNDIS_NIF]**. The valid entries in the file are listed below:

[LMNDIS_NIF]

DRIVERNAME - LMNDIS\$

This line must always be present

IOADDRESS - value

where value is one of the following address:

0x220, 0x300, 0x320, 0x340.

The leading **0x** for the hex notation is required.

To have Card Services select the address base from it's pool of available address then use a value of 0.

INTERRUPT - value

where values is one of the following interrupts:

3, 4, 5, 7, 9, 10, 11, 12, 15.

To have Card Services select an available interrupt resource then place a value of 0 at this location.

Notes for Packet Driver

The following are examples of CONFIG.SYS file for loading System Soft? Card Services and packet driver.

Examples of partial CONFIG.SYS file:

```
device=c:\cardsoft\ss365sl.exe
device=c:\cardsoft\cs.exe
device=c:\cardsoft\csalloc.exe c:\cardsoft\csalloc.ini
device=c:\tcpip\carden.exe /iop=nnn /irq=n /com=n /mir=n
device=c:\cardsoft\cardid.exe
device=c:\tcpip\lmpd.com
```

Notes for Windows for Workgroups

After installation of the MT5634ZLX/FE card drivers, the system will automatically update both CONFIG.SYS and AUTOEXEC.BAT for you so that the driver will be loaded upon system start up. When modifying the two files, the system will make copies named CONFIG.ABO and AUTOEXEC.ABO in the system's directory. If the driver of PC Card is not successfully loaded, replace the two *.ABO file for related file and try to start the system again.

The following are examples of CONFIG.SYS and AUTOEXEC.BAT for loading System Soft? Card Services and drivers for Windows for Workgroups:

Examples of CONFIG.SYS file:

```
device=c:\cardsoft\ss365sl.exe
device=c:\cardsoft\cs.exe
device=c:\cardsoft\csalloc.exe c:\cardsoft\csalloc.ini
device=c:\wfw311\carden.exe /iop=nnn /irq=n /com=n /mir=n
device=c:\cardsoft\cardid.exe
device=c:\wfw311\ifshlp.sys
```

Examples of AUTOEXEC.BAT file:

```
C:\WFW311\NETSTART
```

NDIS2 Driver for Windows for Workgroups

1. Run Windows for Workgroups and click the **Network Setup** icon in **Network** group.
2. In the **Network Settings** dialog box, click the **Networks...** button to select the network operating system.
3. In the **Networks** dialog box, check the radio button before **Install Microsoft Windows Network** and **No Additional Network**. Click **OK** to go back the **Network Settings** screen.
4. Click the **Drivers...** button to select network driver.
5. In the **Network Drivers** dialog box, click the **Add Adapter...** button to enter the **Add Network Adapter** dialog box. Select **Unlisted or Updated Network Adapter** then click **OK**.
6. Windows will prompt the **Install Driver** dialog box. At this time, put the driver diskette into floppy drive then click **OK**.
7. Select the **Real mode NDIS2 for...** string then click **OK**.
8. Follow Windows instructions to complete the installation and exit Windows.
9. Run INSTALL.EXE from root directory of driver diskette.

10. Select **Windows for Workgroup** in Network Operating System screen.
11. If current settings are acceptable, select **Start Installation** and go to step 13. Otherwise, select **Modify Parameters** to make settings changed.
12. Move cursor to the setting you want to make a change for then click **Enter** to select a fit value. When the configuration is set completely, click **Enter** on the **OK** field to exit the screen then go back to step 11.
13. Select **NDIS Server(LAN Manager,...)** as the network server that you will attach to then press the **Enter** key.
14. The installation program starts to copy related files to the destination directory and modifies AUTOEXEC.BAT under user? agreement.
15. Reboot the computer to let the driver take effect.

ODI Driver for Workgroups

1. Run Windows for Workgroups and click the **Network Setup** icon in **Network** group.
2. In the **Network Settings** dialog box, click the **Networks...** button to select the network operating system.
3. In the **Networks** dialog box, check the radio button before **Install Microsoft Windows Network** and **Others:**. Select **Netware Shell, 3.X or 4.0 and above**, then click **OK** to go back to the **Network Settings** dialog box.
4. Click the **Drivers...** button to select network driver.
5. In the **Network Drivers** dialog box, click the **Add Adapter...** button to enter the **Add Network Adapter** dialog box. Select **Unlisted or Updated Network Adapter** then click **OK**.
6. Windows displays the **Install Driver** dialog box. Insert the Driver diskette into the floppy drive, then click **OK**.
7. Select the **Netware ODI Driver ...** string then click **OK**.
8. Follow Windows' instructions to complete the installation, then exit Windows.
9. Run INSTALL.EXE from the root directory of Driver diskette.
10. Select **Windows for Workgroup** in Network Operating System screen.
11. If the current settings are accepted, select **Start Installation** and go to step 13. Otherwise, select **Modify Parameters** to make settings changed.
12. Move cursor to the setting you want to make a change for then click **Enter** to select a fit value. When the configuration is set completely, click **Enter** on the **OK** field to exit the screen.
13. Select **Novell Netware Server** as the network server that you will connect to then press the **Enter** key.
14. The Installation program starts to copy related files to the destination directory and modifies AUTOEXEC.BAT and NET.CFG under user agreement.
15. Reboot the computer to let the driver take effect.

Appendix D: Warranty, Service, and Technical Support

Limited Warranty

Multi-Tech Systems, Inc. (MTS) warrants that this product will be free from defects in material or workmanship for a period of ten years from the date of purchase or, if date of purchase is not provided, ten years from the date of shipment (limited to customers in the U.S., Canada, Mexico, and United Kingdom). For customers in all other countries, due to certain legal restrictions, MTS warrants that this product will be free from defects in material or workmanship for a period of five years from the date of purchase or, if date of purchase is not provided, five years from the date of shipment, unless otherwise limited or prohibited by law.

MTS MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

This warranty does not apply to any products that have been damaged by lightning storms, water, or power surges, or that have been neglected, altered, abused, used for a purpose other than the one for which they were manufactured, repaired by the customer or any party without MTS's written authorization, or used in any manner inconsistent with MTS's instructions.

MTS's entire obligation under this warranty shall be limited (at MTS's option) to repair or replacement of any products that prove to be defective within the warranty period, or, at MTS's option, issuance of a refund of the purchase price. Defective products must be returned by Customer to MTS's factory with transportation prepaid.

MTS WILL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES AND UNDER NO CIRCUMSTANCES WILL ITS LIABILITY EXCEED THE PURCHASE PRICE FOR DEFECTIVE PRODUCTS.

Online Warranty Registration

If you have access to the World Wide Web, you can register your Multi-Tech product online at the following URL:

<http://www.multitech.com/register>

Service

If you are outside the USA, your local distributor of Multi-Tech products usually offers the quickest and most economical repair option. If necessary, you may send your modem to our Mounds View factory in the USA. A modem that is shipped to us from outside the USA must have a Returned Materials Authorization (RMA) and shipping instructions. To return a modem for repair from inside the USA, no RMA is required; simply send it to us freight prepaid. Include a description of the problem, a return shipping address, and a check or purchase order for out-of-warranty repairs.

Please send modems that require repairs to the following address:

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, MN 55112
Attn: Repair

If you are shipping from outside the USA, please contact our Repair Department for an RMA prior to your shipment. You can contact us by telephone at +(612) 785-3500 or by fax at +(612) 785-9874.

Technical Support

Multi-Tech Systems has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, please call (800) 972-2439 (USA and Canada) or (612) 785-3500 (international and local). Please have modem information available. You can also contact Technical Support via the following URL:

http://www.multitech.com/_forms/email_tech_support.htm.

The Multi-Tech BBS

For customers who do not have Internet access, Multi-Tech maintains a bulletin board system (BBS) that mirrors its FTP site. Information available from the BBS includes new product information, product upgrade files, and problem-solving tips. The phone number for the Multi-Tech BBS is (800) 392-2432 (USA and Canada) or (612) 785-3702 (international and local).

The BBS can be accessed by any asynchronous modem operating at 1200 bps to 33,600 bps at a setting of 8 bits, no parity, and 1 stop bit (8-N-1).

To Log on to the Multi-Tech BBS

1. Set your communications program to **8-N-1**.
2. Dial our BBS at (800) 392-2432 (USA and Canada) or (612) 785-3702 (international and local).
3. At the prompts, type your first name, last name, and password; then press ENTER. If you are a first time caller, the BBS asks if your name is spelled correctly. If you answer yes, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
4. Click ENTER until the Main Menu appears. From the Main Menu you have access to two areas: the Files Menu and News. For help on menu commands, type **?**.

To Download a File

If you know the file name

1. From the Main Menu, type **F** to access the Files Menu, then type **D**.
2. Enter the name of the file you wish to download from the BBS.
3. If a password is required, enter the password.
4. Answer **Y** or **N** to the automatic logoff question.
5. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
6. If you select Zmodem, the transfer will begin automatically. If you select another protocol, you may have to initiate the transfer yourself. (In most data communications programs, the PAGE DOWN key initiates the download.)
7. When the download is complete, press ENTER to return to the File Menu.
8. To exit the BBS, type **G** and press ENTER.

If you don't know the file name

1. From the Main Menu, type **F** to access the Files Menu. For a list of file areas, type **L**, press ENTER, then type **L** and press ENTER again. (If you do not type the second **L**, you will list all of the files on the BBS.)
2. Mark each file area you would like to examine by typing its list number and clicking ENTER.
3. Enter **L** to list all the files in the selected file areas. Enter **C** to go forward in the file list and **P** to go back.

4. To mark one or more files for download, type **M**, press ENTER, type the list numbers of the files, and press ENTER again.
5. Enter **D**. You will see a list of the files you have marked. Enter **E** if you would like to edit the list; otherwise enter **D** again to start the download process.
6. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
7. If you select Zmodem, the file will transfer automatically. If you select another protocol, you may have to initiate the transfer yourself. (In most data communications programs, the PAGE DOWN key initiates the download.)
8. When the download is complete, press ENTER to return to the File Menu.
9. To exit the BBS, type **G** and press ENTER.

About the Internet

Multi-Tech is a commercial provider on the Internet, and we retrieve e-mail messages from the following mailboxes on a periodic basis:

Multi-Tech's presence includes a Web site at:

<http://www.multitech.com>

and an ftp site at:

<ftp://ftp.multitech.com>

About the MultiMobile™ SoftGSM™ Cellular Upgrade

Get complete mobile freedom with your notebook computer, Multi-Tech PCMCIA card and your GSM cellular phone with MultiMobile™ SoftGSM. It's a simple, integrated, software-enabled communication solution.

- Get E-mail, fax, file transfer and Internet access anytime, anywhere
- Compatible with leading GSM cellular phones including, Ericsson, Nokia, and Siemens
- Includes support for Short Message Service (SMS)
- Simple to install
- Secure communication

For more information, or to order MultiMobile SoftGSM upgrade software kit, contact the Multi-Tech office nearest you, or visit our website at <http://www.multitech.com> .

About Ordering Accessories

SupplyNet, Inc. can supply you with replacement transformers, cables and connectors for select Multi-Tech products. You can place an order with SupplyNet via mail, phone, fax or the Internet at:

Mail: SupplyNet, Inc.
614 Corporate Way
Valley Cottage, NY 10989

Phone: 800 826-0279

Fax: 914 267-2420

Email: info@thesupplynet.com

Internet: <http://www.thesupplynet.com>

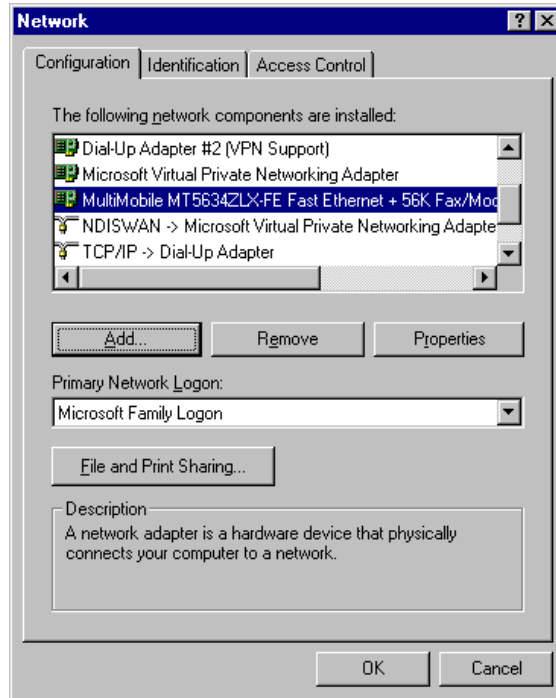
SupplyNet Online Ordering Instructions

1. Browse to <http://www.thesupplynet.com>. In the **Browse by Manufacturer** drop-down list, select **Multi-Tech** and click 
2. To order, type in quantity, and click 
3. Click  to change your order
4. After you have selected all items, click  to finalize the order. SupplyNet uses Verisign's Secure Socket Layer (SSL) technology to ensure your complete shopping security.

Appendix E: Uninstalling in Windows 95/98

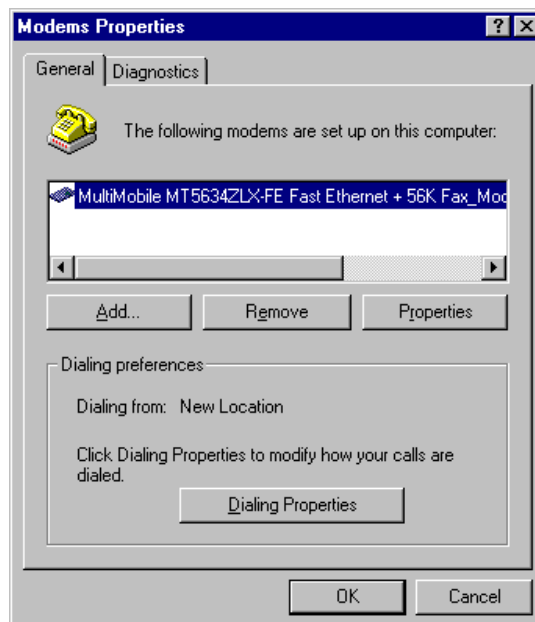
To uninstall the MT5634ZLX/FE properties in Windows 95/98, perform the following procedure.

1. To remove the network interface card, go to **Control Panel | Network** and the **Configuration** tab.



Scroll down to “MultiMobile MT5634ZLX/FE ...”, highlight it, click **Remove**, and follow the prompts (Note that you will need to have your Windows 95/98 CD available).

2. To remove the modems, go to **Control Panel | Modem Properties** and the **General** tab.



Scroll down to “MultiMobile MT5634ZLX/FE ...”, highlight it, click **Remove**, and follow the prompts (Note that you will need to have your Windows 95/98 CD available).

3. Re-start Windows 95/98. The MT5634ZLX/FE is completely uninstalled.

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